FIG. 1

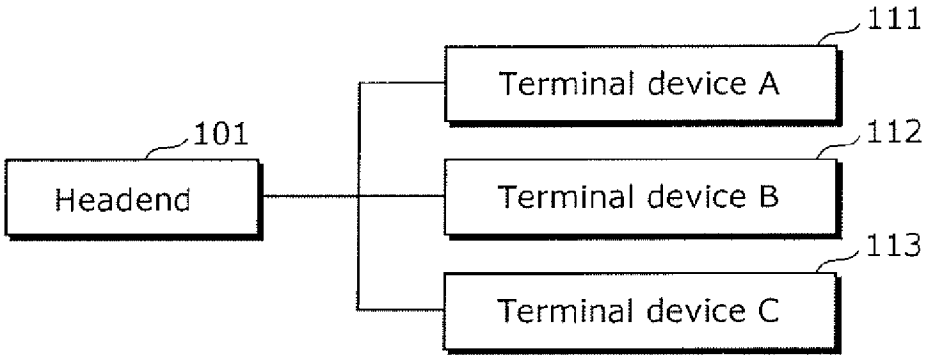

111
Terminal device A
101
Headend
112
Terminal device B
113
Terminal device C

FIG. 2

Frequency band	Usage	Modulation technique
5 to 130 MHz	Out Of Band (OOB) Data exchange between headend and terminals	QPSK
130 to 86 4MHz	In-band Ordinary television broadcasting including video and audio	QAM

FIG. 3

Frequency band	Usage
70 to 74 MHz	Data transmission from headend 101 to terminal device
10.0 to 10.1 MHz	Data transmission from terminal device A111 to headend 101
10.1 to 10.2 MHz	Data transmission from terminal device B112 to headend 101
10.2 to 10.3 MHz	Data transmission from terminal device C113 to headend 101

FIG. 4

Frequency band	Usage
150 to 156 MHz	Television channel 1
156 to 162 MHz	Television channel 2
⋮	⋮
310 to 311 MHz	Radio channel 1
⋮	⋮

FIG. 5

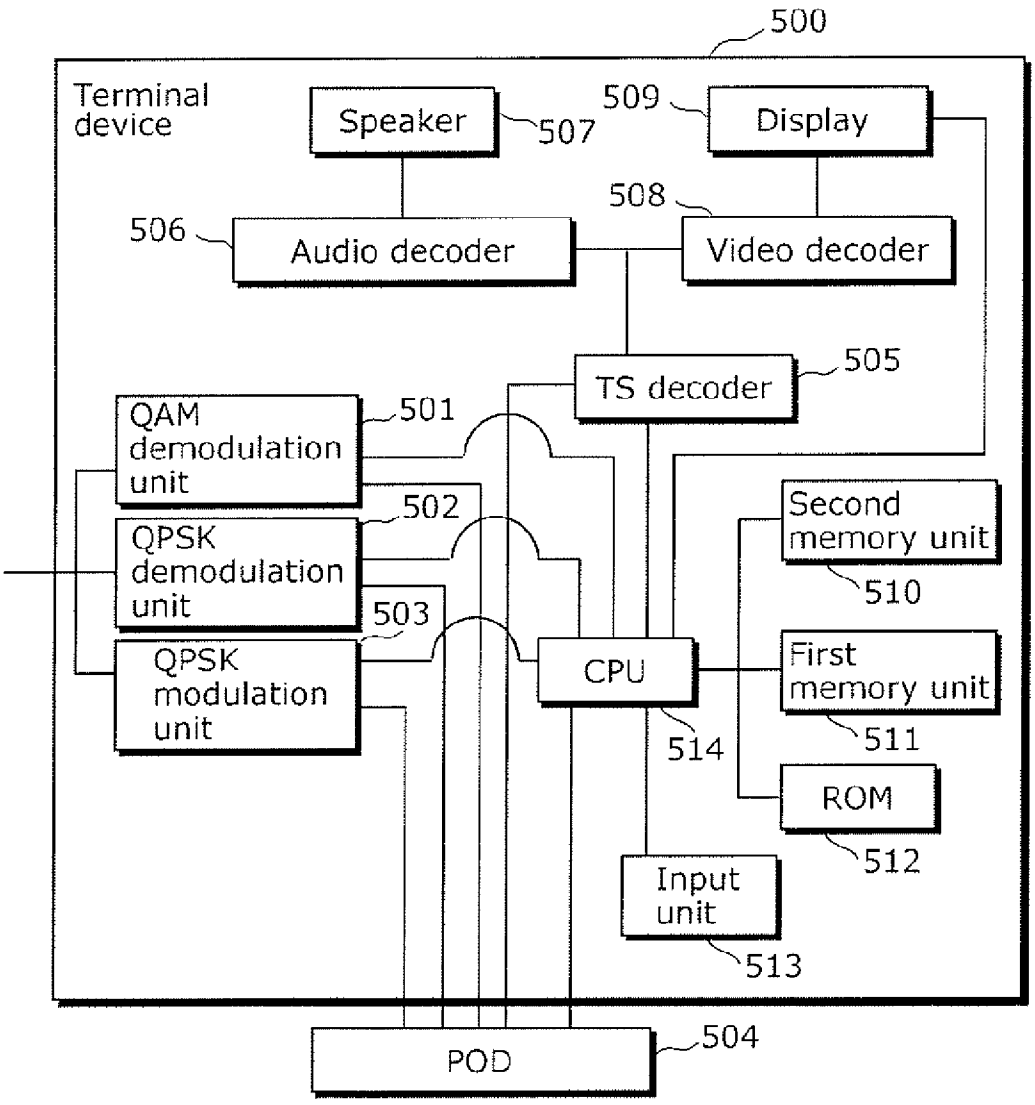

500
Terminal device
Speaker
507
509
Display
508
506
Audio decoder
Video decoder
TS decoder
505
QAM demodulation unit
501
502
QPSK demodulation unit
503
QPSK modulation unit
Second memory unit
510
CPU
First memory unit
511
514
ROM
512
Input unit
513
POD
504

FIG. 6

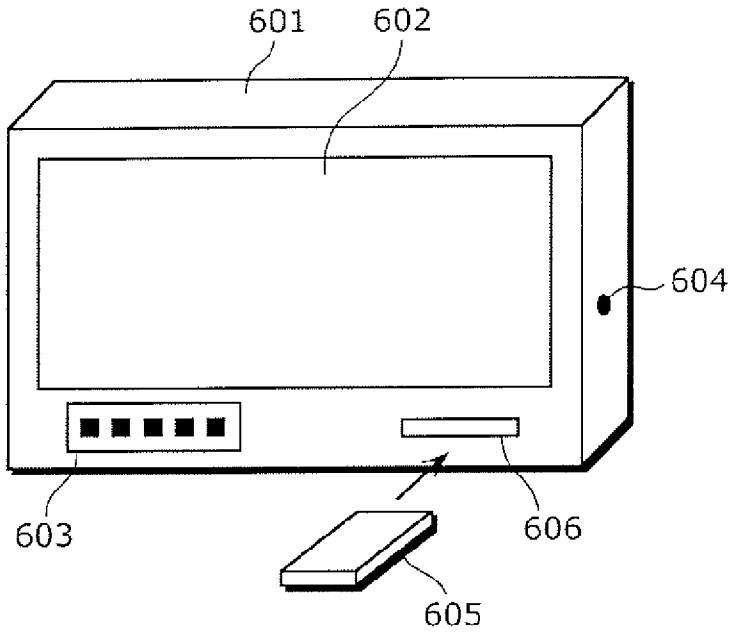

601
602
604
603
606
605

FIG. 7

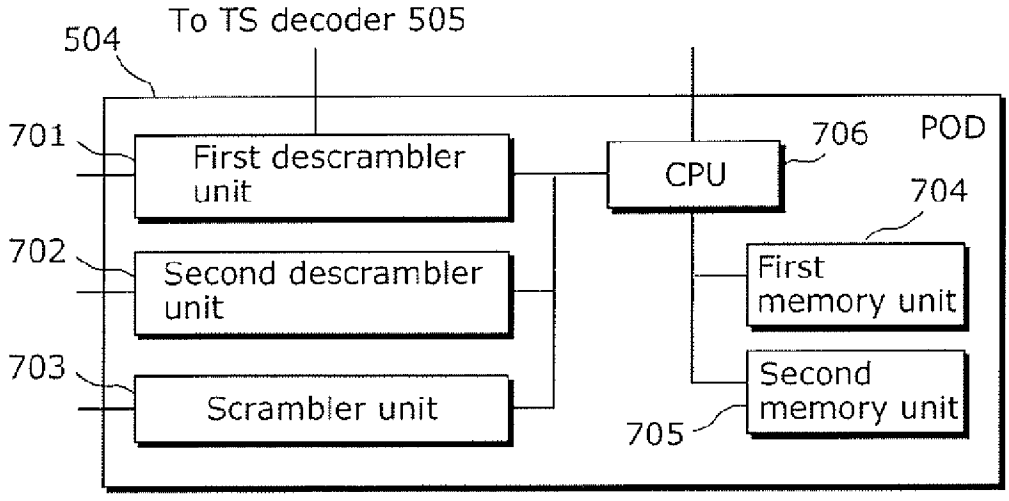

504
To TS decoder 505
701
First descrambler unit
702
Second descrambler unit
703
Scrambler unit
706
CPU
POD
704
First memory unit
Second memory unit
705

FIG. 8

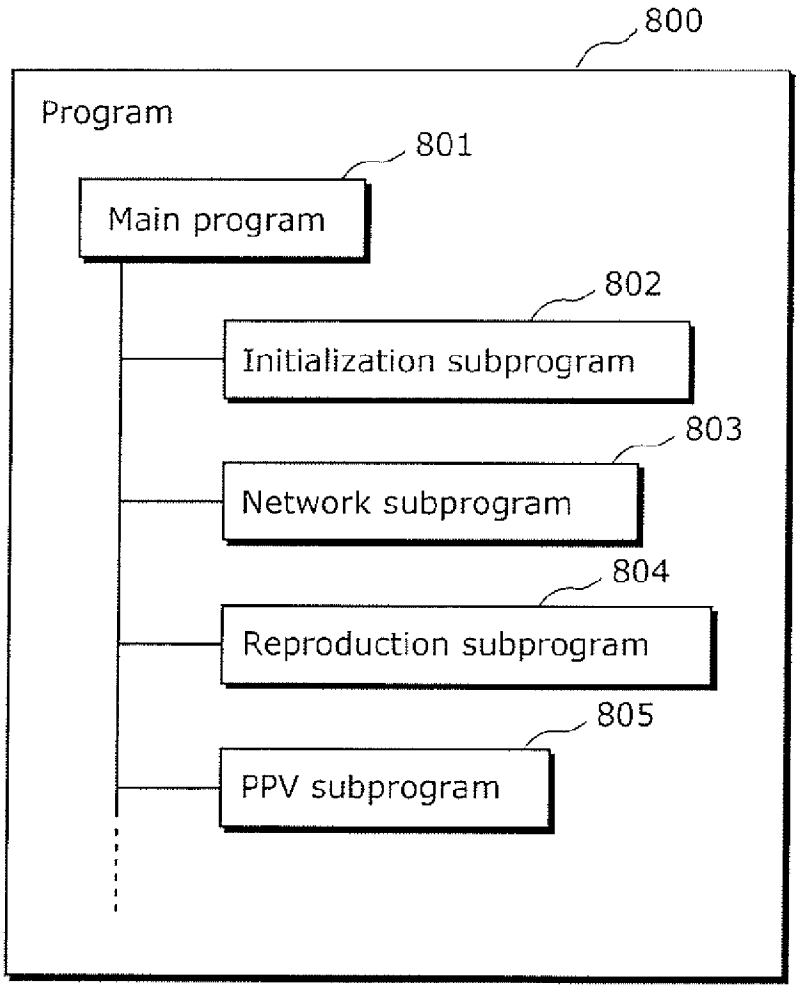

800
Program
801
Main program
802
Initialization subprogram
803
Network subprogram
804
Reproduction subprogram
805
PPV subprogram

FIG. 9

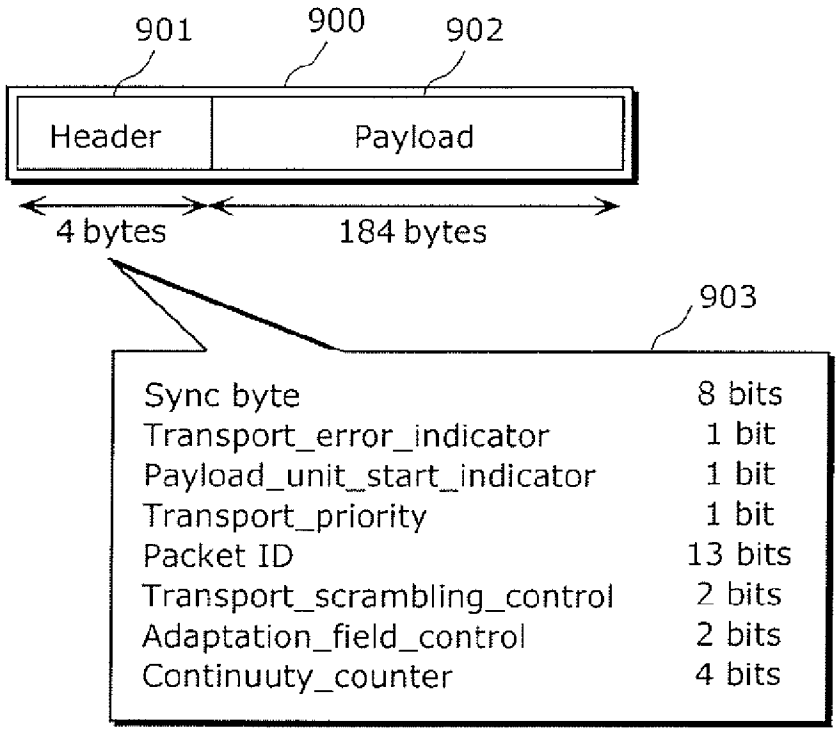

901
900
902
Header
Payload
4 bytes
184 bytes
903
Sync byte 8 bits
Transport_error_indicator 1 bit
Payload_unit_start_indicator 1 bit
Transport_priority 1 bit
Packet ID 13 bits
Transport_scrambling_control 2 bits
Adaptation_field_control 2 bits
Continuuty_counter 4 bits

FIG. 10

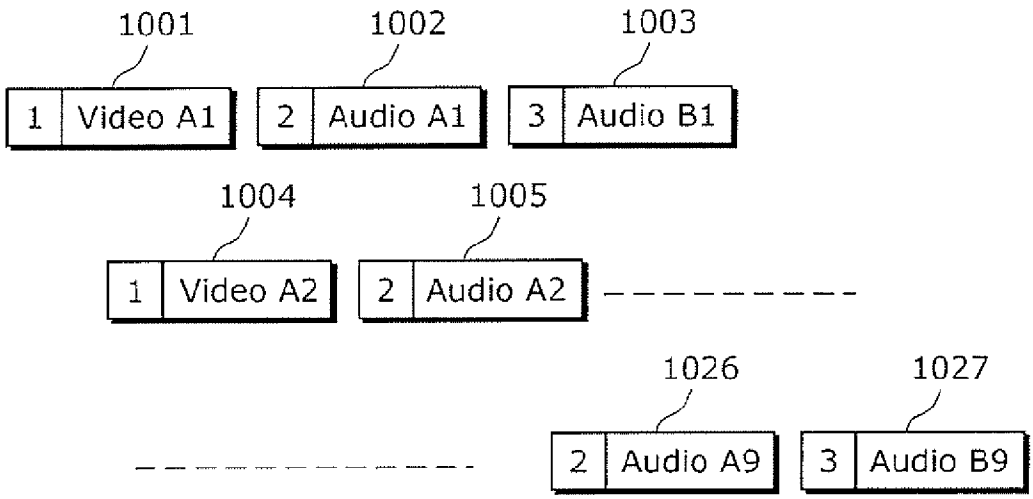

1001
1002
1003
1 Video A1
2 Audio A1
3 Audio B1
1004
1005
1 Video A2
2 Audio A2
1026
1027
2 Audio A9
3 Audio B9

FIG. 11

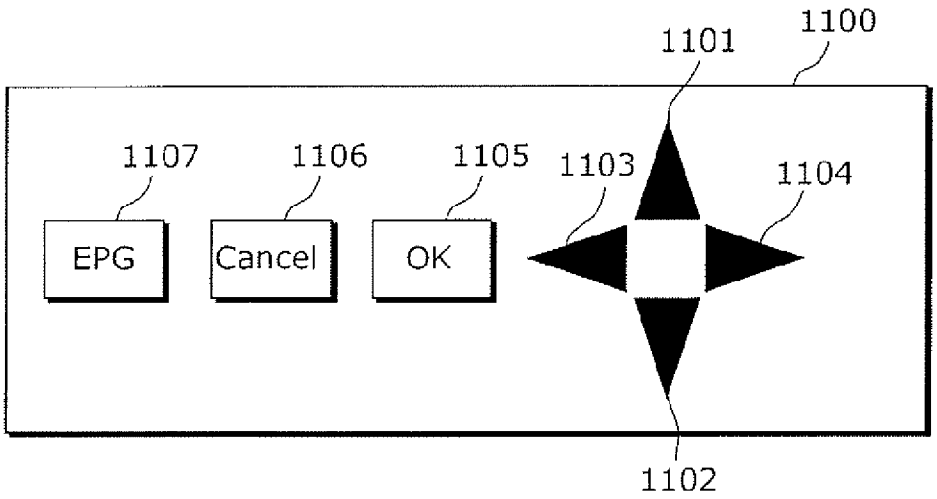

1100
1101
1107
1106
1105
1103
1104
EPG
Cancel
OK
1102

FIG. 12

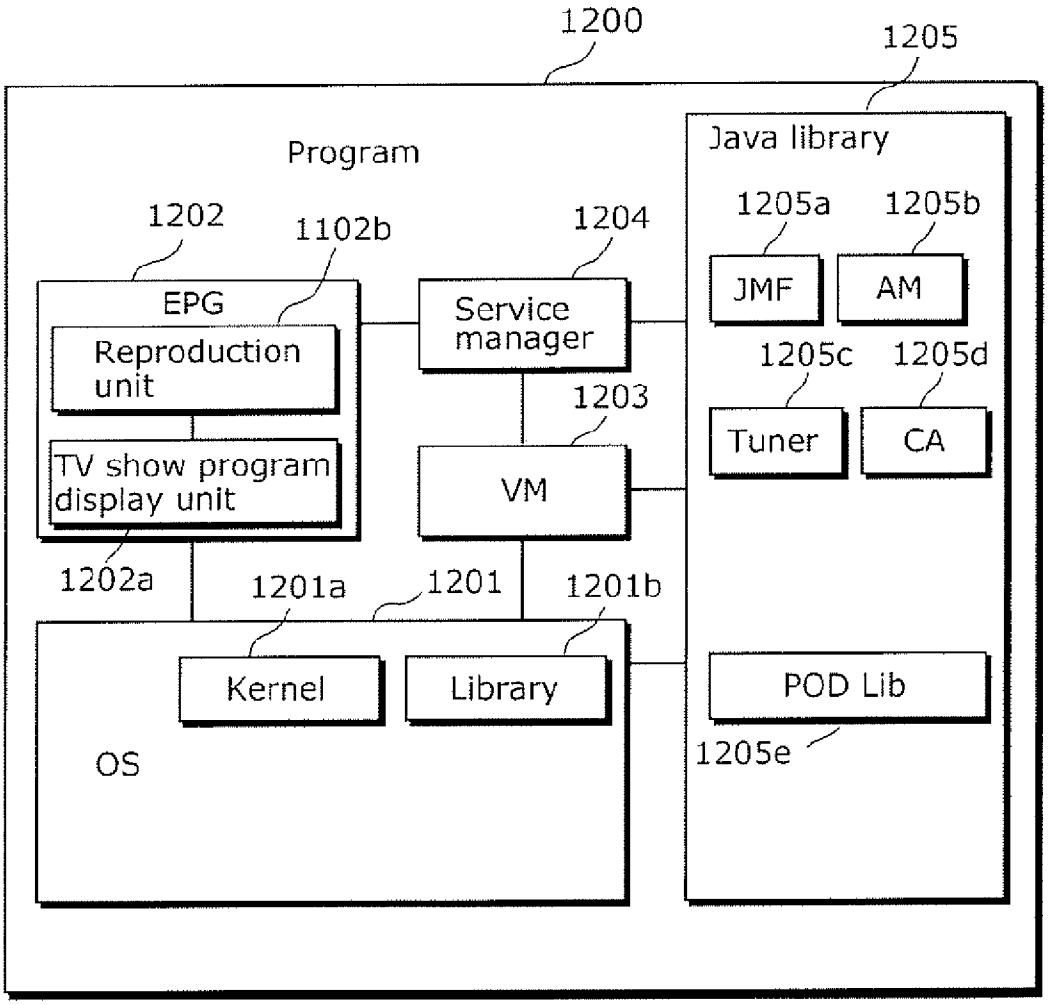

1200
1205
Program
Java library
1202
1102b
1204
1205a
1205b
EPG
Reproduction unit
TV show program display unit
Service manager
JMF
AM
1205c
1205d
1203
Tuner
CA
VM
1202a
1201a
1201
1201b
Kernel
Library
POD Lib
OS
1205e

FIG. 13A

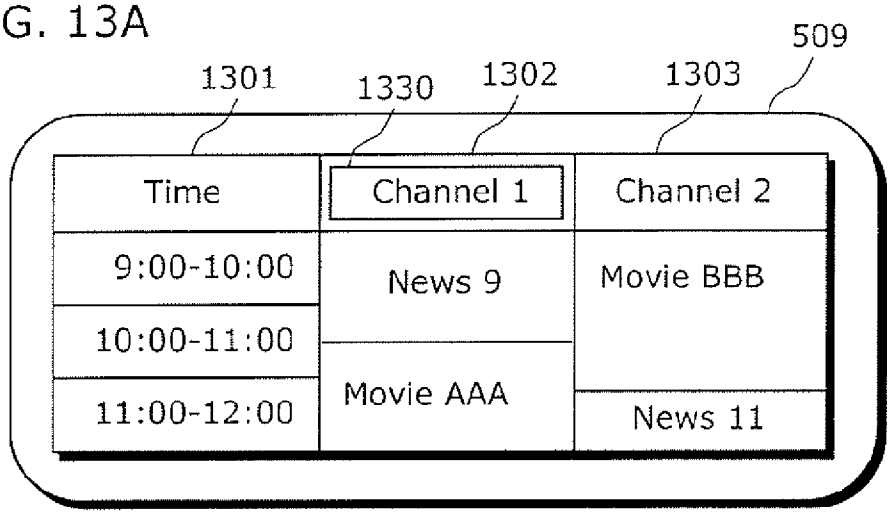


FIG. 13B

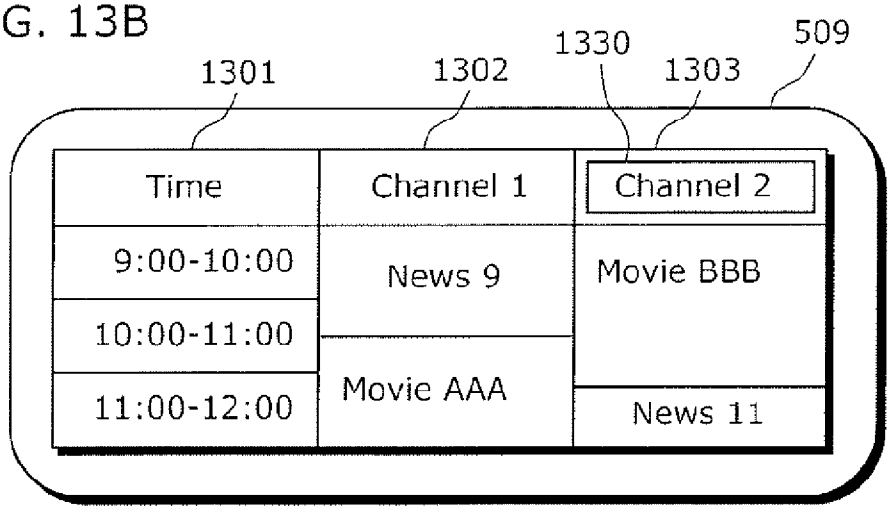


FIG. 14

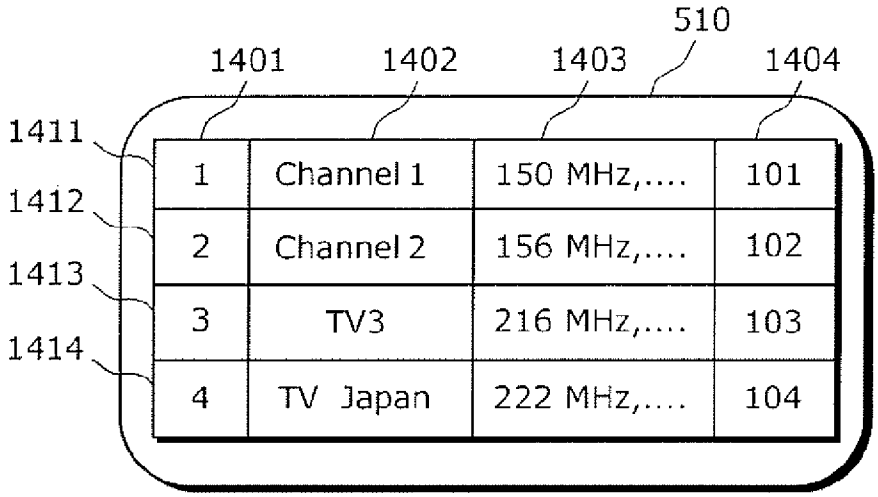


FIG. 15A

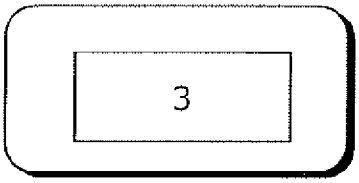


FIG. 15B

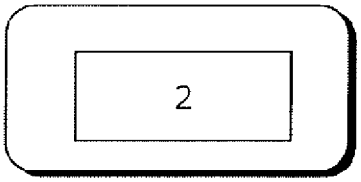


FIG. 15C

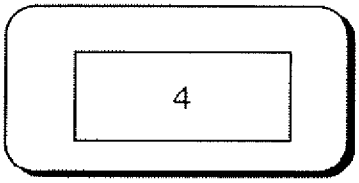


FIG. 16

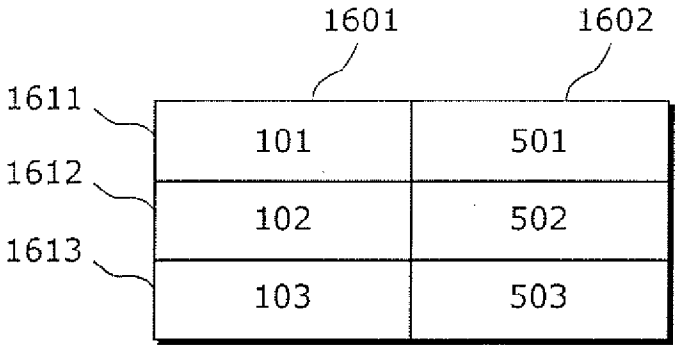

1601
1602
1611
1612
1613
101
501
102
502
103
503

FIG. 17

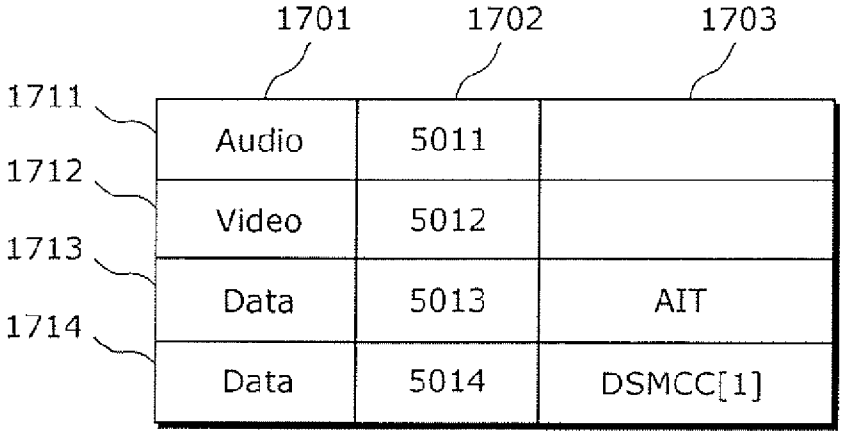

1701
1702
1703
1711
1712
1713
1714
Audio
5011
Video
5012
Data
5013
AIT
Data
5014
DSMCC[1]

FIG. 18

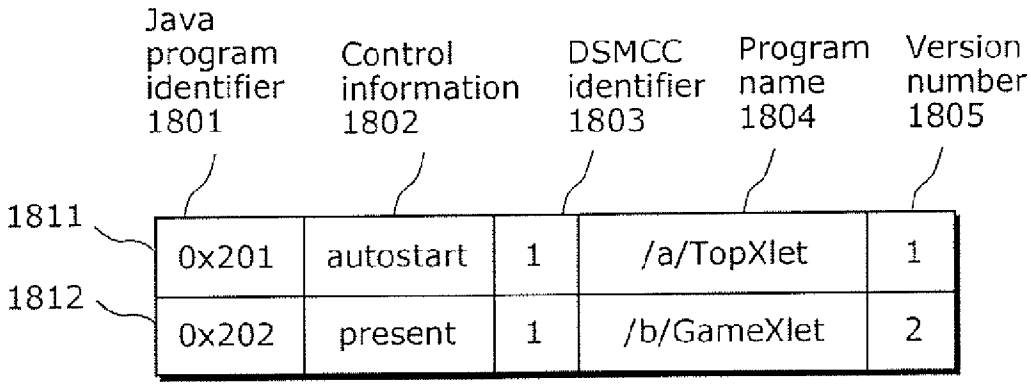

Java program identifier 1801
Control information 1802
DSMCC identifier 1803
Program name 1804
Version number 1805
1811
1812
0x201
autostart
1
/a/TopXlet
1
0x202
present
1
/b/GameXlet
2

FIG. 19

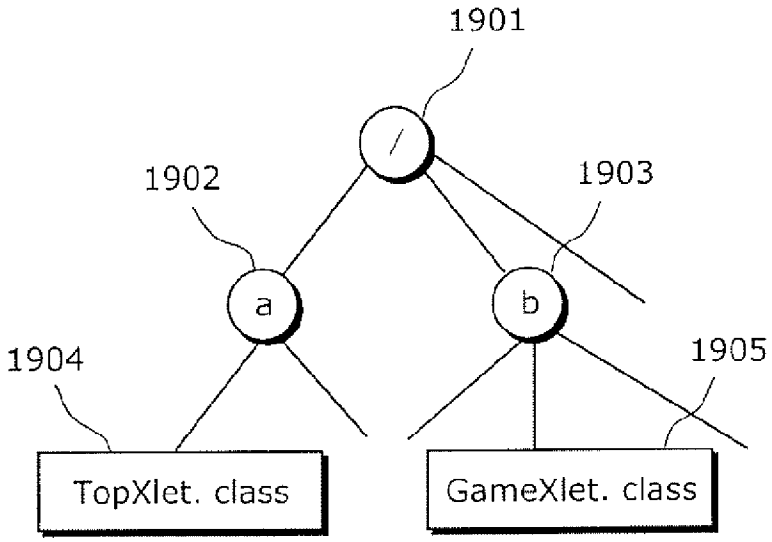

1901
/
1902
1903
a
b
1904
1905
TopXlet. class
GameXlet. class

FIG. 20

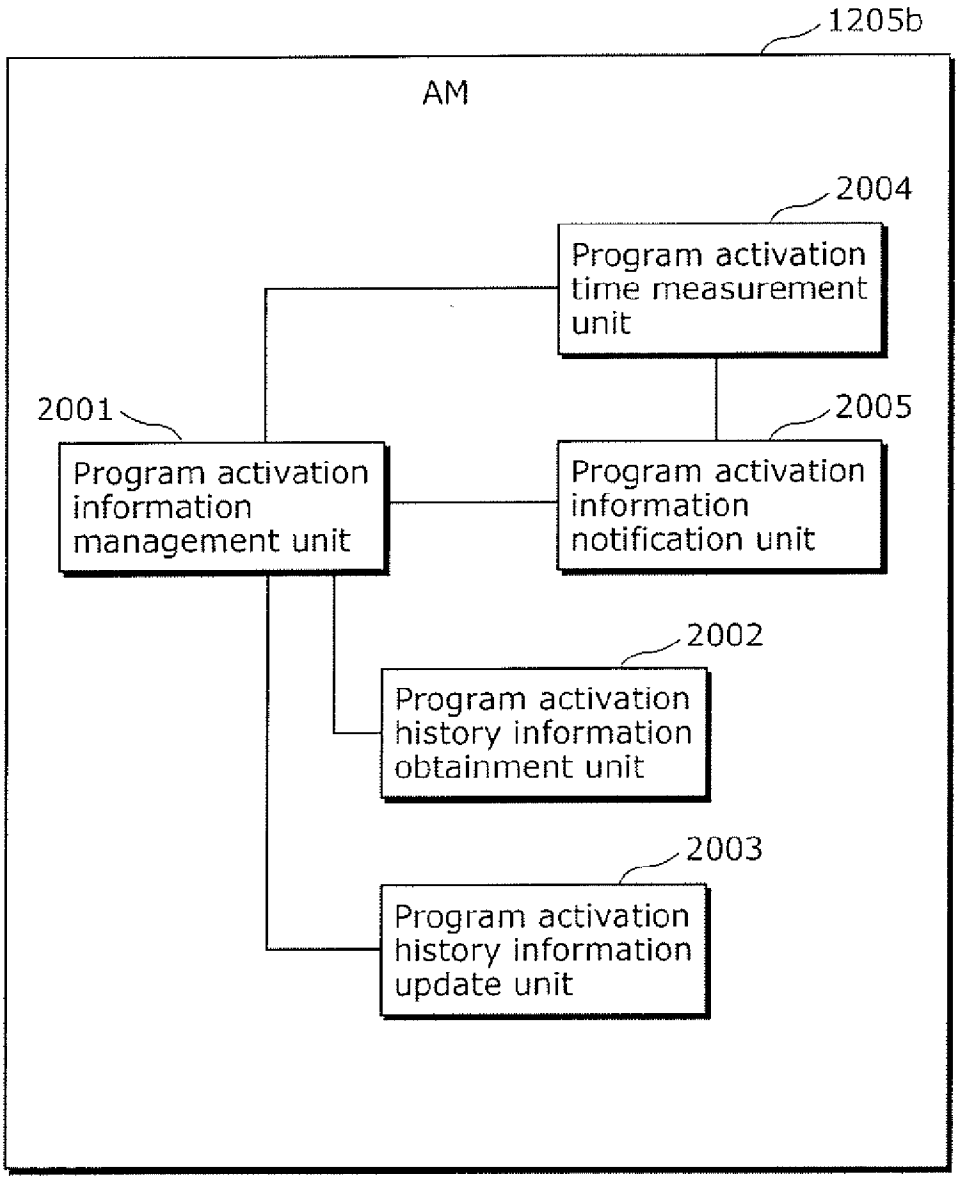

1205b
AM
2004
Program activation time measurement unit
2001
2005
Program activation information management unit
Program activation information notification unit
2002
Program activation history information obtainment unit
2003
Program activation history information update unit

FIG. 21A

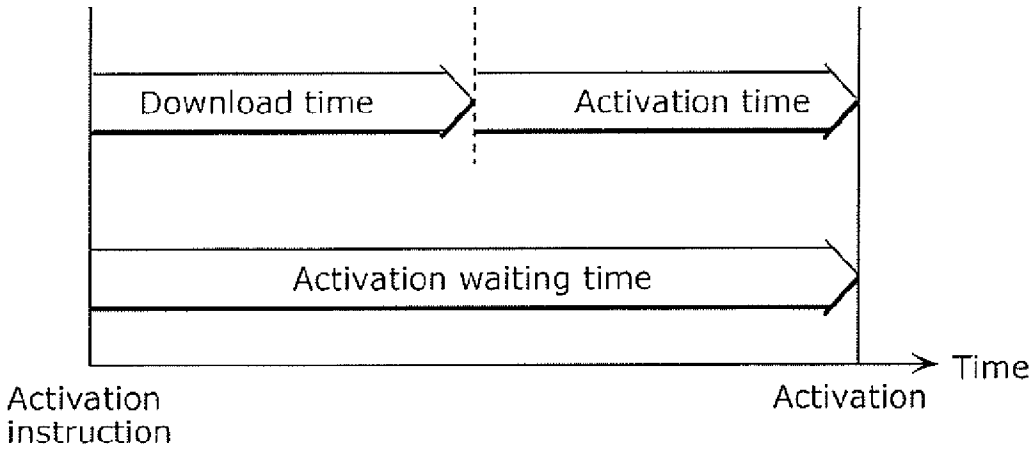


FIG. 21B

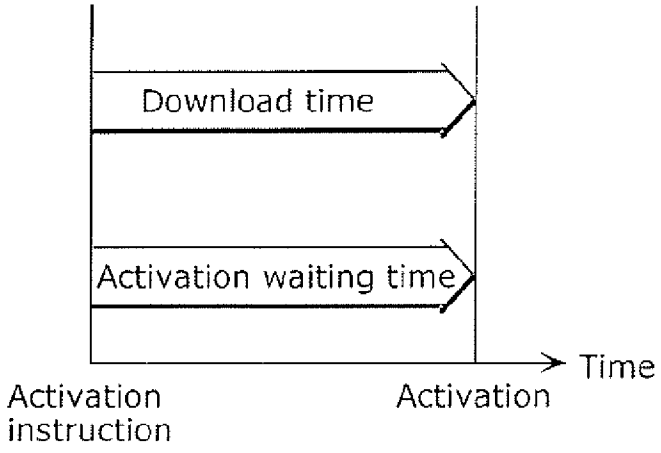


FIG. 22

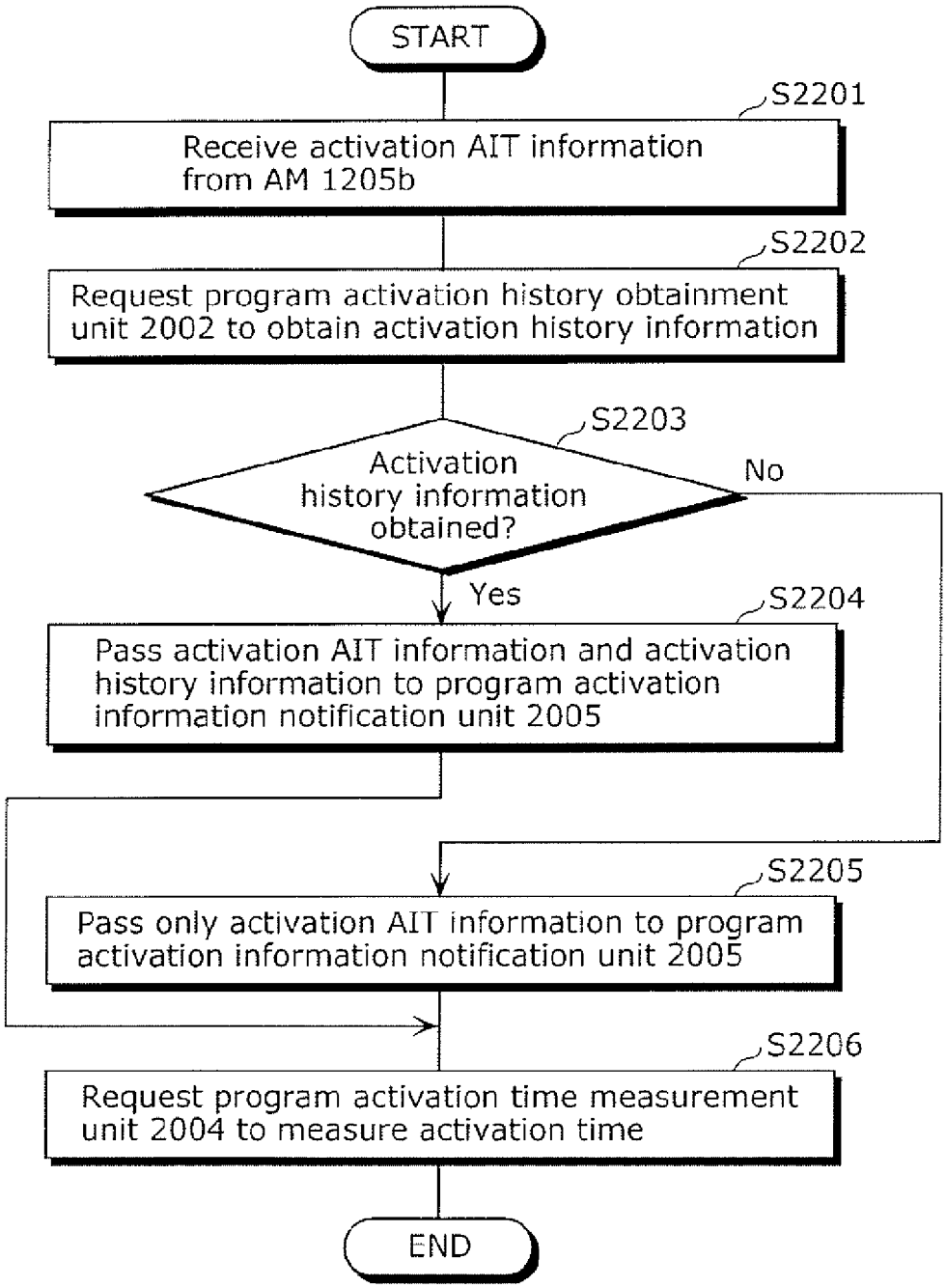

START
S2201
Receive activation AIT information from AM 1205b
S2202
Request program activation history obtainment unit 2002 to obtain activation history information
S2203
Activation history information obtained?
No
Yes
S2204
Pass activation AIT information and activation history information to program activation information notification unit 2005
S2205
Pass only activation AIT information to program activation information notification unit 2005
S2206
Request program activation time measurement unit 2004 to measure activation time
END

FIG. 23

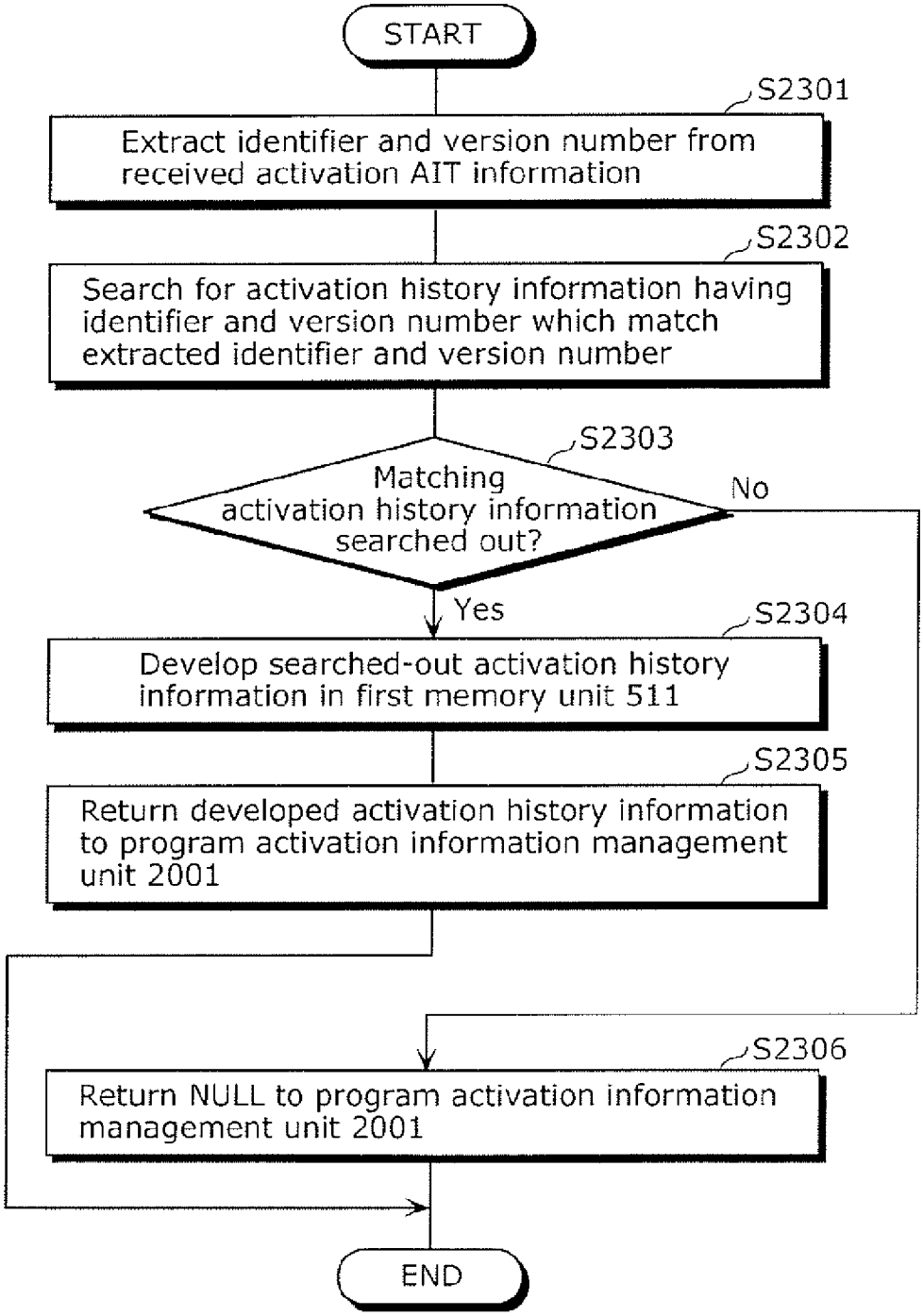

START
S2301
Extract identifier and version number from received activation AIT information
S2302
Search for activation history information having identifier and version number which match extracted identifier and version number
S2303
Matching activation history information searched out?
No
Yes
S2304
Develop searched-out activation history information in first memory unit 511
S2305
Return developed activation history information to program activation information management unit 2001
S2306
Return NULL to program activation information management unit 2001
END

FIG. 24

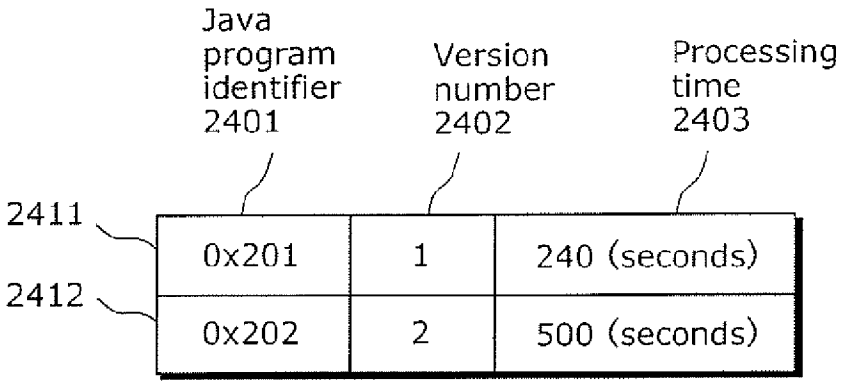

Java program identifier 2401
Version number 2402
Processing time 2403
2411
2412
0x201
1
240 (seconds)
0x202
2
500 (seconds)

FIG. 25

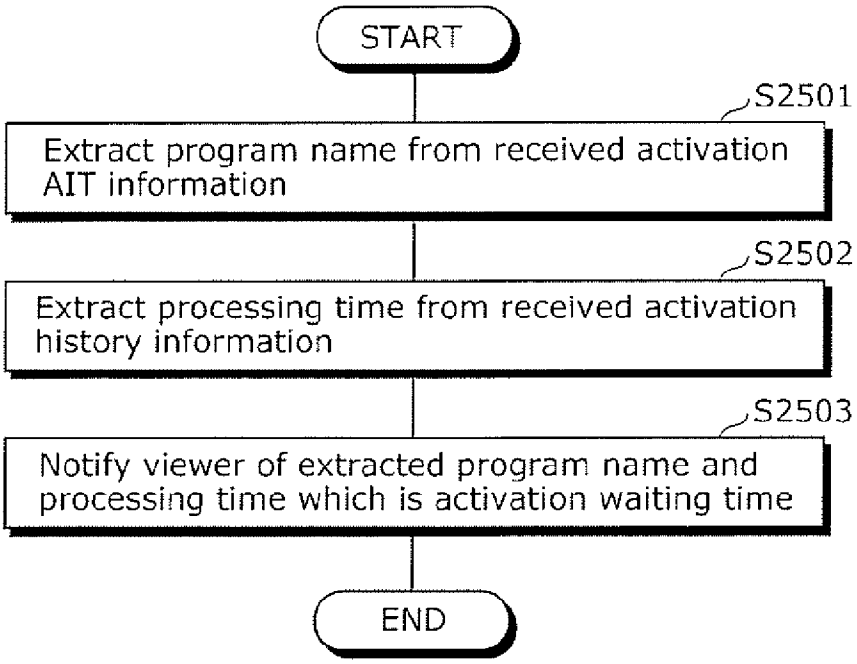

START
S2501
Extract program name from received activation AIT information
S2502
Extract processing time from received activation history information
S2503
Notify viewer of extracted program name and processing time which is activation waiting time
END

FIG. 26

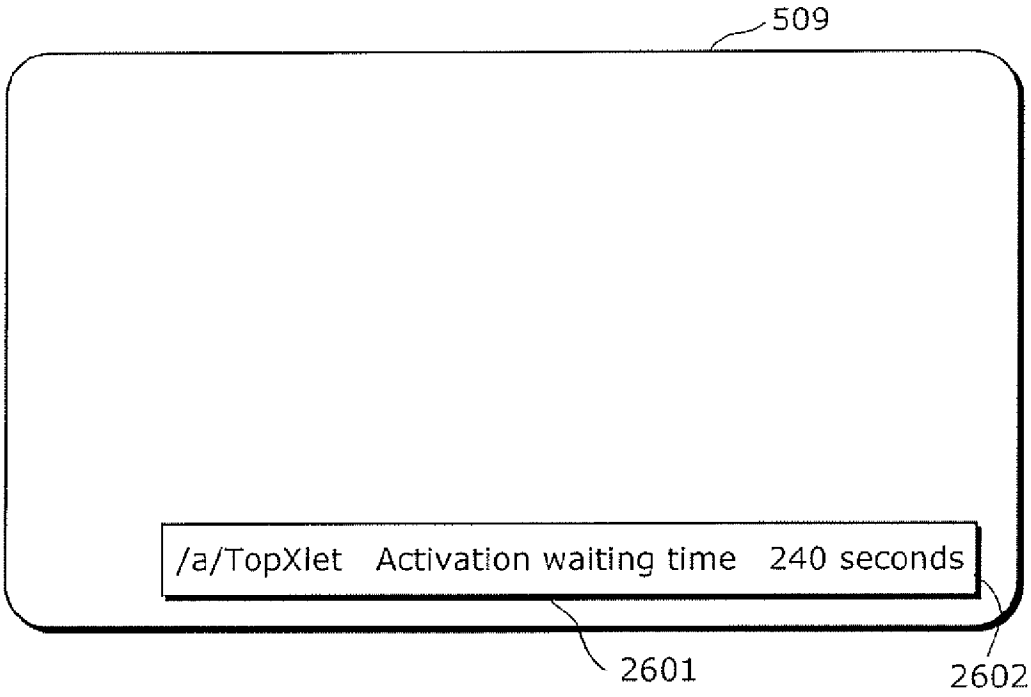

509
/a/TopXlet Activation waiting time 240 seconds
2601
2602

FIG. 27

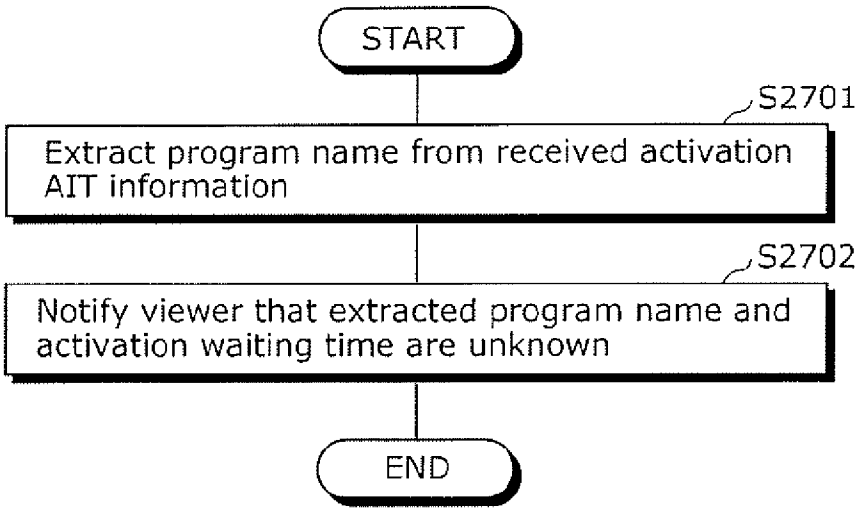

START
S2701
Extract program name from received activation AIT information
S2702
Notify viewer that extracted program name and activation waiting time are unknown
END

FIG. 28

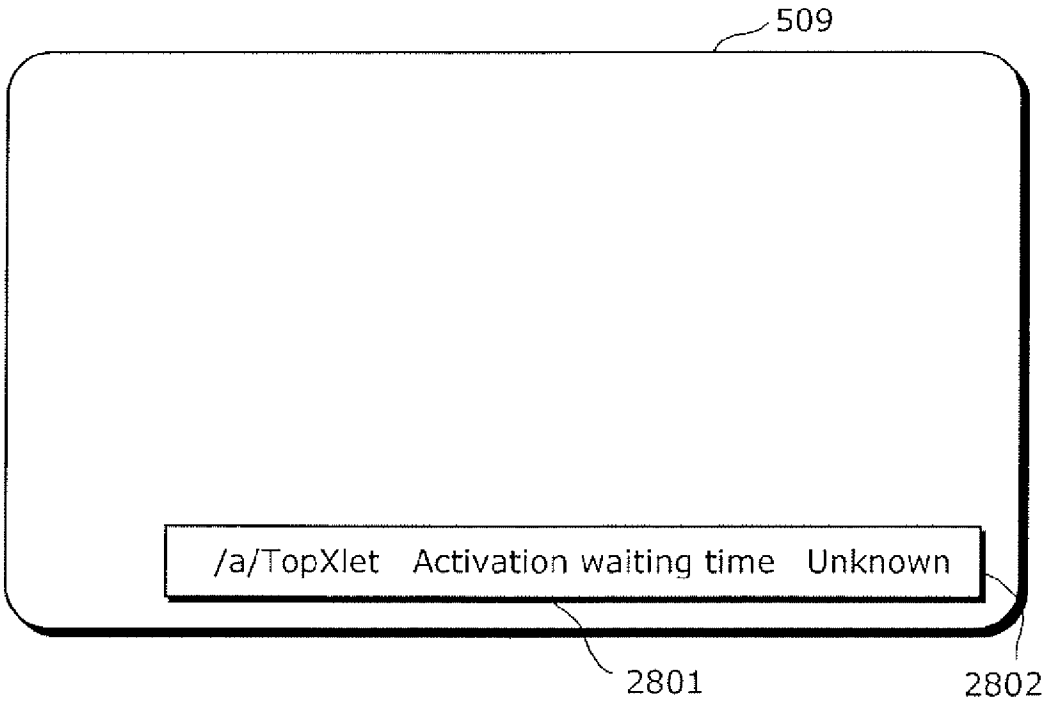

509
/a/TopXlet Activation waiting time Unknown
2801
2802

FIG. 29

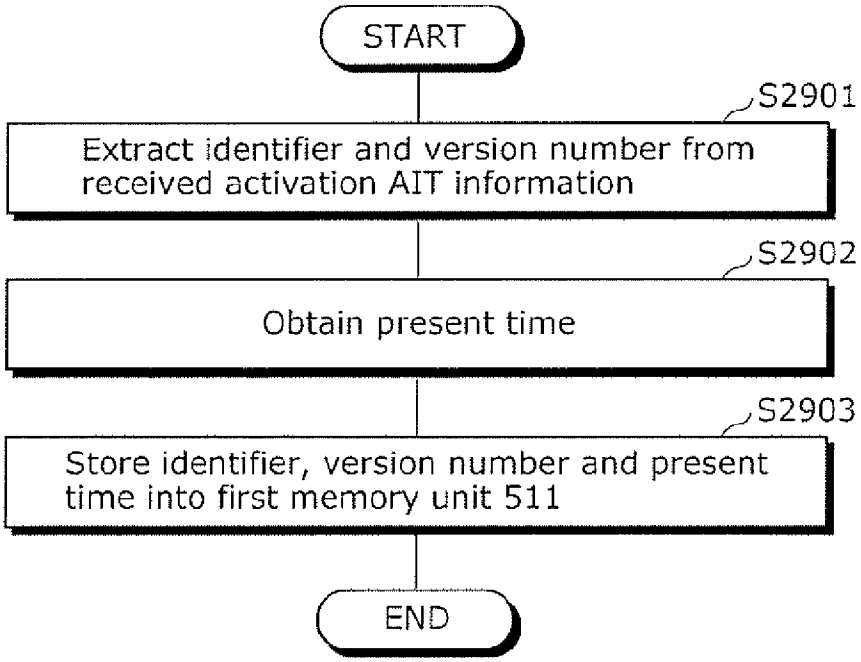

START
S2901
Extract identifier and version number from received activation AIT information
S2902
Obtain present time
S2903
Store identifier, version number and present time into first memory unit 511
END

FIG. 30

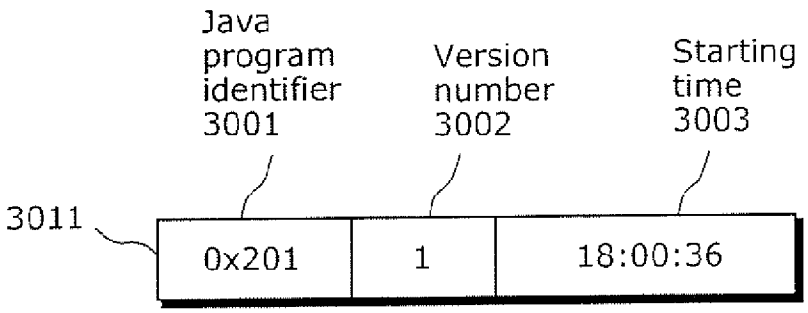

Java program identifier 3001
Version number 3002
Starting time 3003
3011
0x201
1
18:00:36

FIG. 31

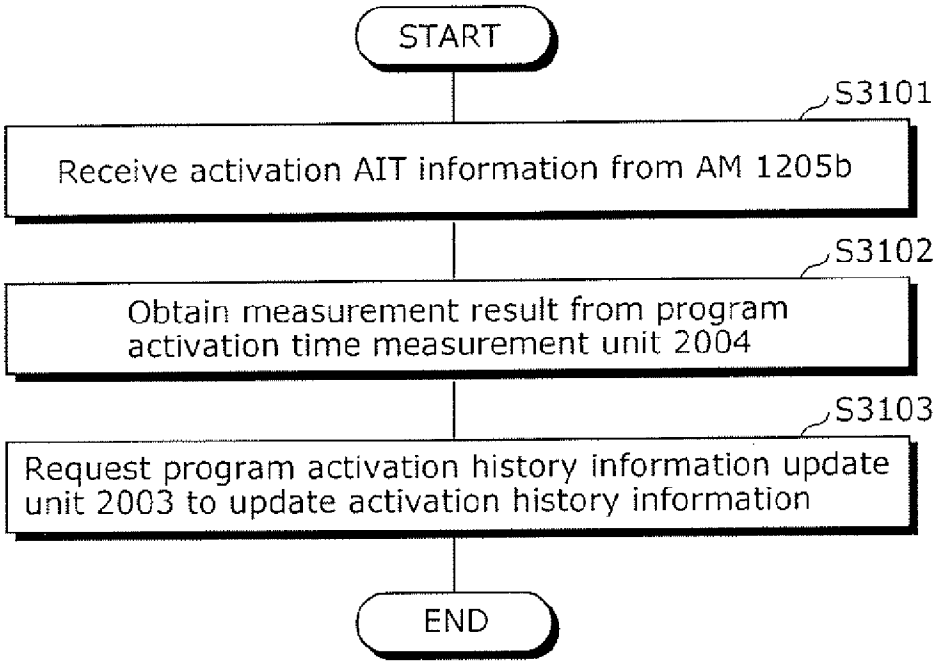

START
S3101
Receive activation AIT information from AM 1205b
S3102
Obtain measurement result from program activation time measurement unit 2004
S3103
Request program activation history information update unit 2003 to update activation history information
END

FIG. 32

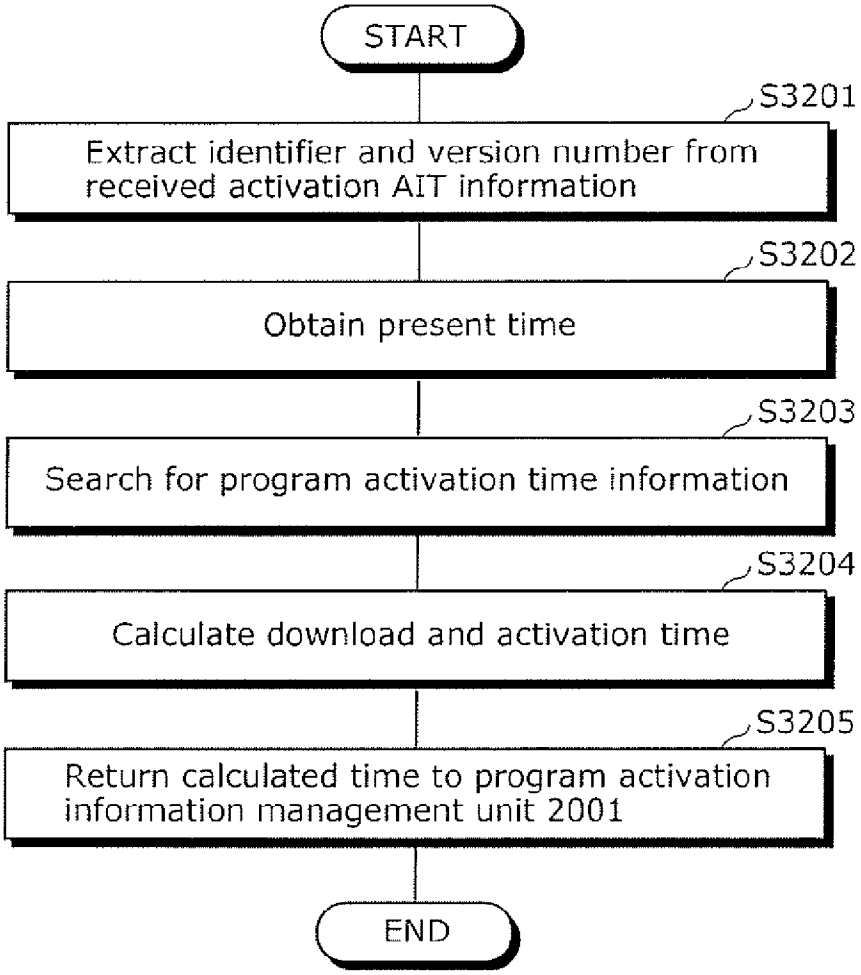

START
S3201
Extract identifier and version number from received activation AIT information
S3202
Obtain present time
S3203
Search for program activation time information
S3204
Calculate download and activation time
S3205
Return calculated time to program activation information management unit 2001
END

FIG. 33

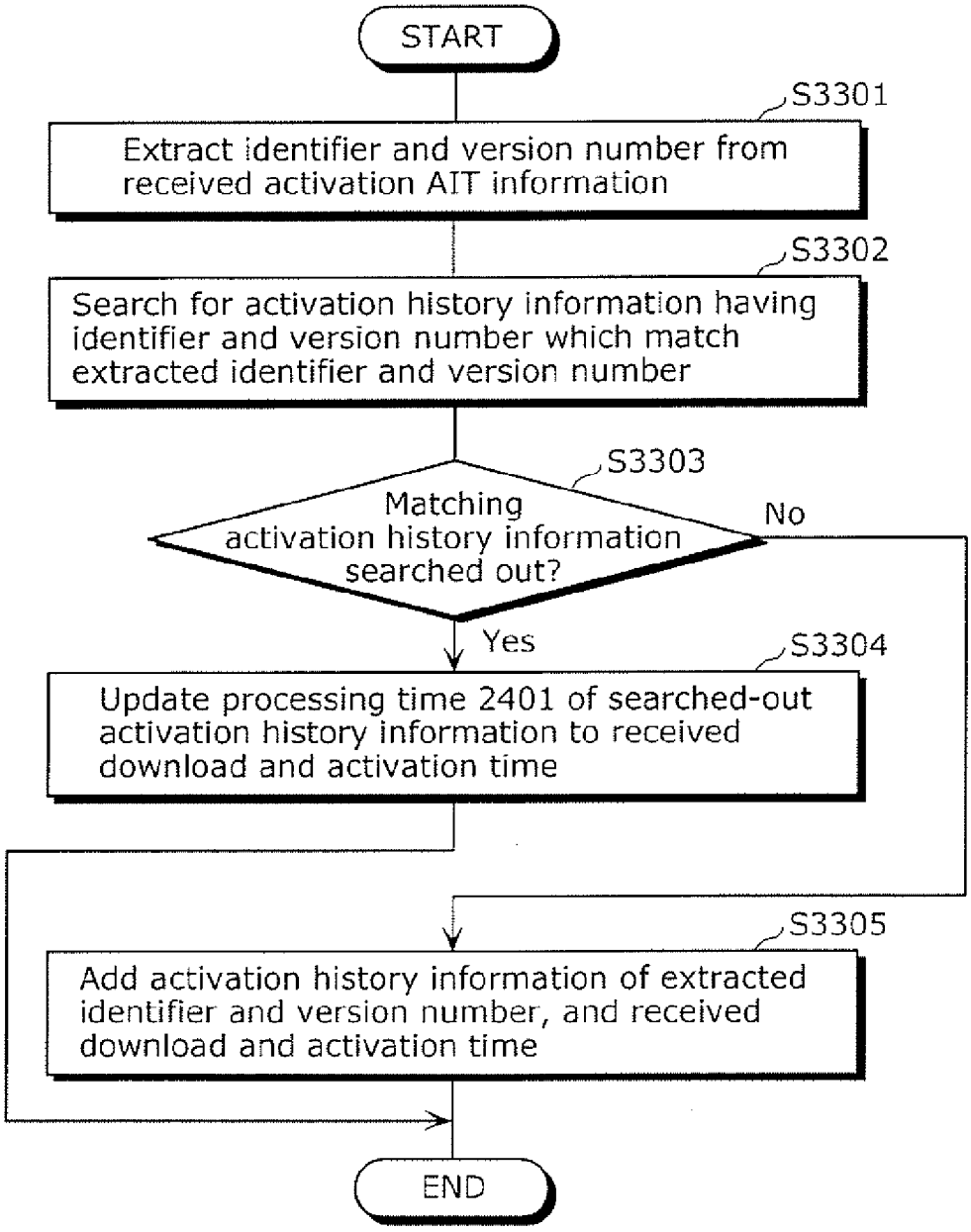

START
S3301
Extract identifier and version number from received activation AIT information
S3302
Search for activation history information having identifier and version number which match extracted identifier and version number
S3303
Matching activation history information searched out?
No
Yes
S3304
Update processing time 2401 of searched-out activation history information to received download and activation time
S3305
Add activation history information of extracted identifier and version number, and received download and activation time
END

FIG.34

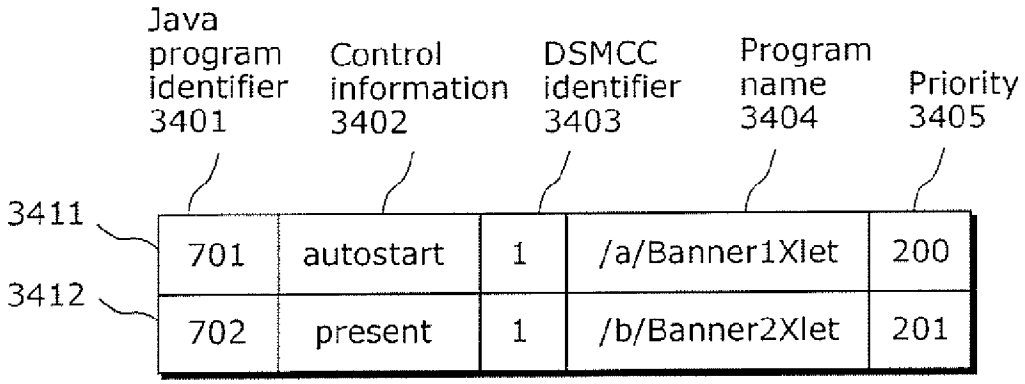

Java program identifier 3401
Control information 3402
DSMCC identifier 3403
Program name 3404
Priority 3405
3411
3412
701
autostart
1
/a/Banner1Xlet
200
702
present
1
/b/Banner2Xlet
201

FIG.35

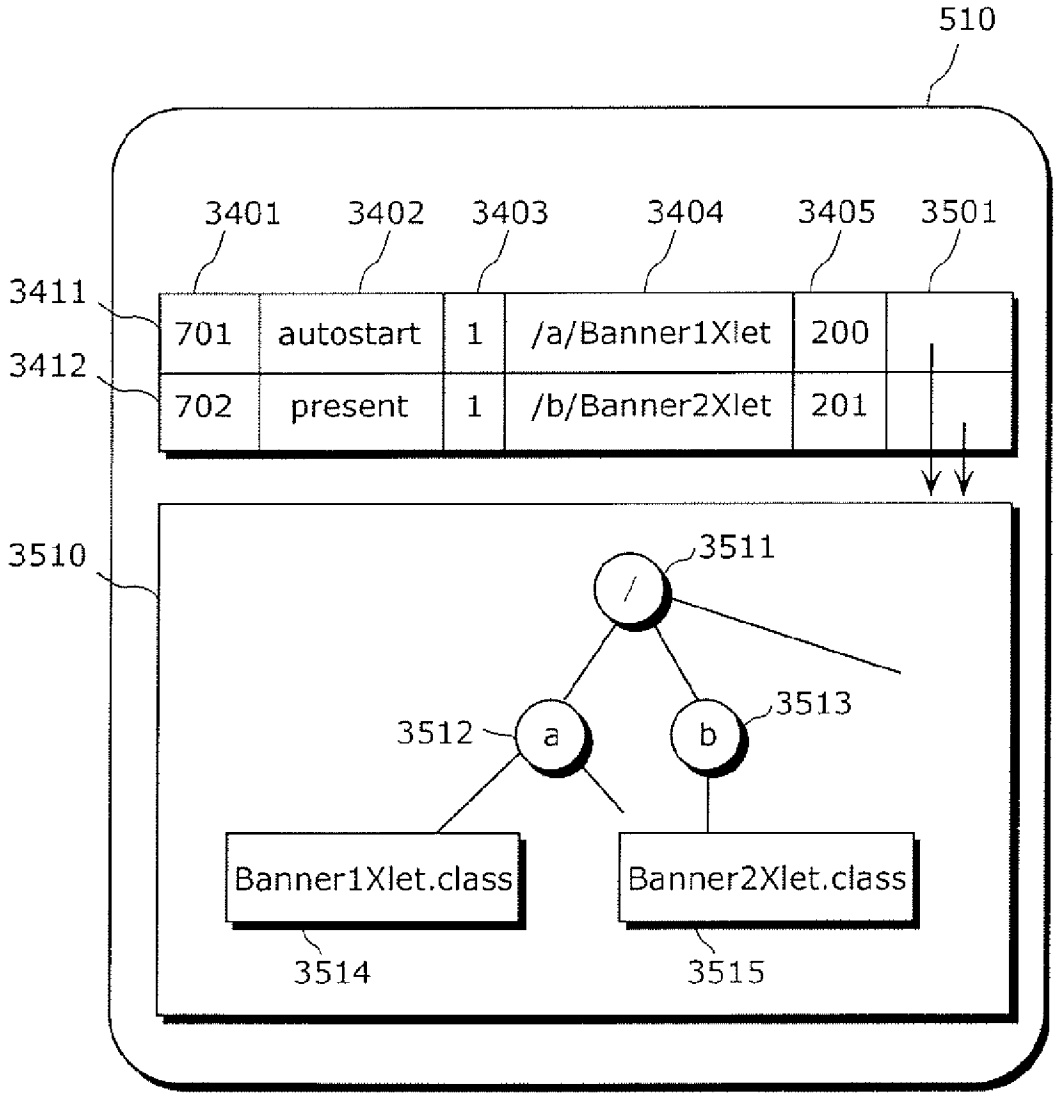

510
3401
3402
3403
3404
3405
3501
3411
3412
701
autostart
1
/a/Banner1Xlet
200
702
present
1
/b/Banner2Xlet
201
3510
3511
/
3512
a
b
3513
Banner1Xlet.class
Banner2Xlet.class
3514
3515

FIG. 36

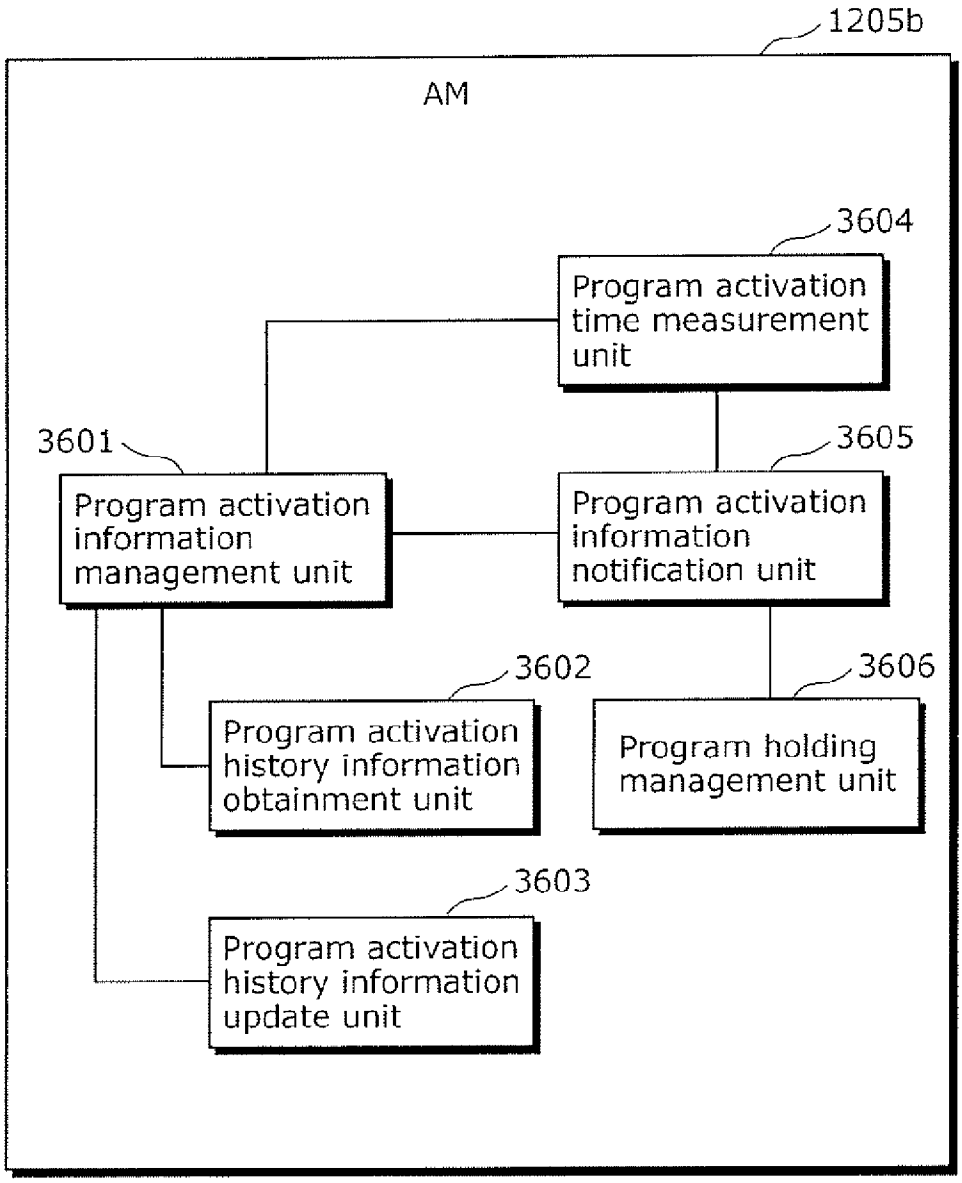

1205b
AM
3604
Program activation time measurement unit
3601
3605
Program activation information management unit
Program activation information notification unit
3602
3606
Program activation history information obtainment unit
Program holding management unit
3603
Program activation history information update unit

FIG. 37

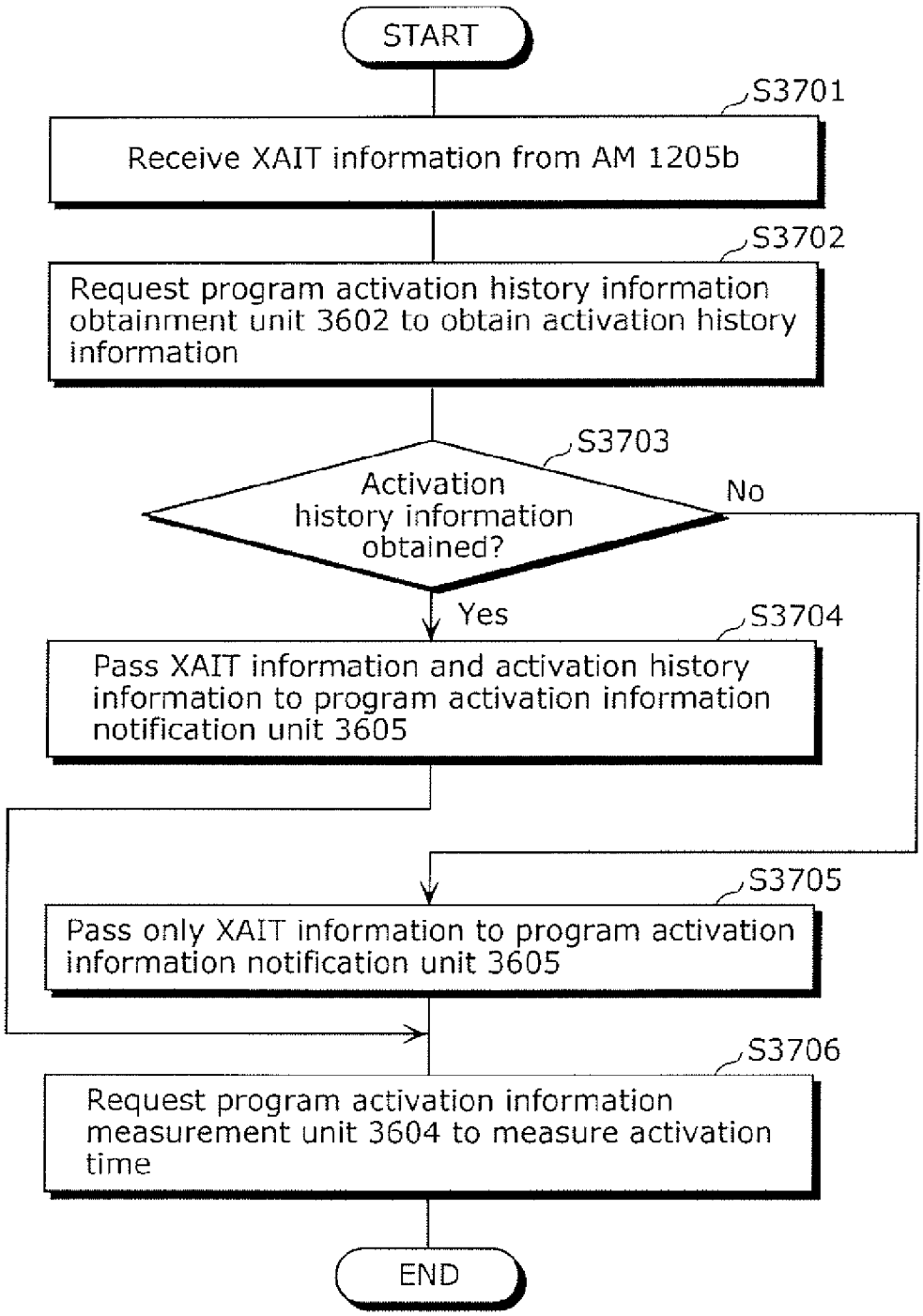

START
S3701
Receive XAIT information from AM 1205b
S3702
Request program activation history information obtainment unit 3602 to obtain activation history information
S3703
Activation history information obtained?
No
Yes
S3704
Pass XAIT information and activation history information to program activation information notification unit 3605
S3705
Pass only XAIT information to program activation information notification unit 3605
S3706
Request program activation information measurement unit 3604 to measure activation time
END

FIG. 38

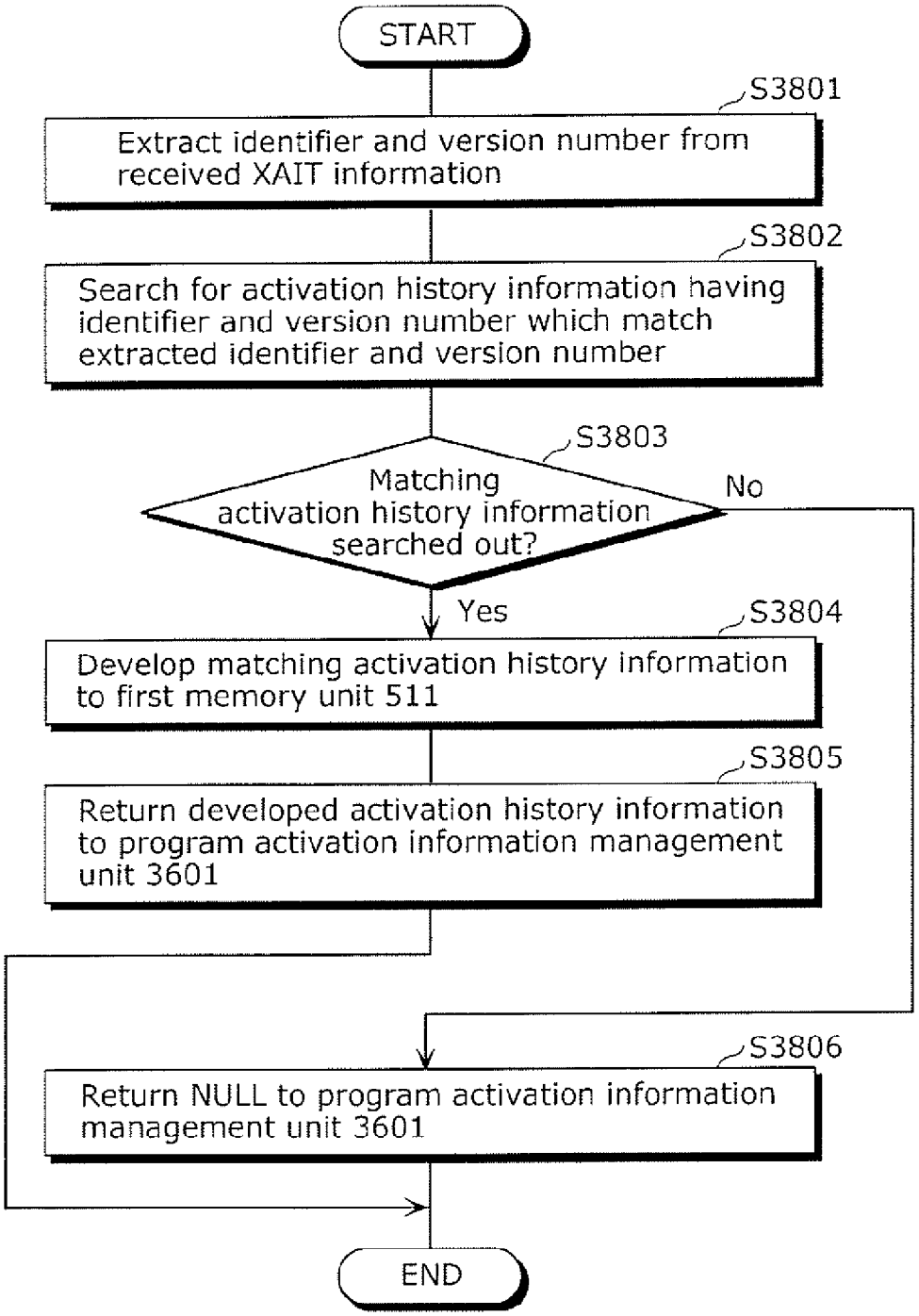

START
S3801
Extract identifier and version number from received XAIT information
S3802
Search for activation history information having identifier and version number which match extracted identifier and version number
S3803
Matching activation history information searched out?
No
Yes
S3804
Develop matching activation history information to first memory unit 511
S3805
Return developed activation history information to program activation information management unit 3601
S3806
Return NULL to program activation information management unit 3601
END

FIG. 39

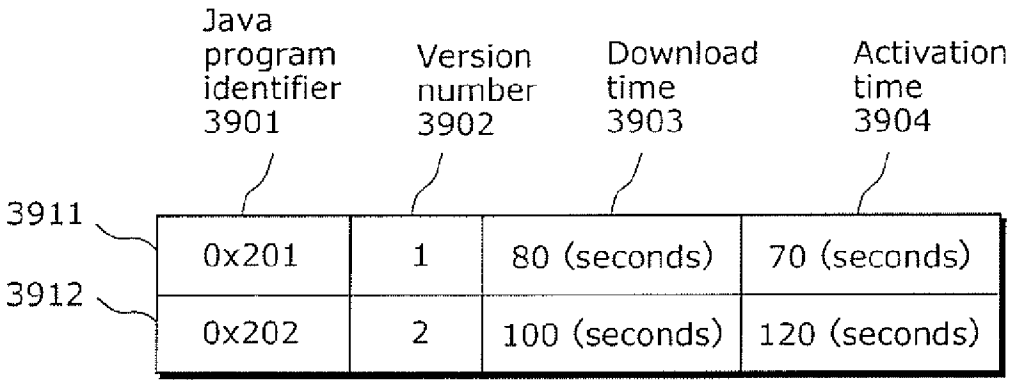

Java program identifier 3901
Version number 3902
Download time 3903
Activation time 3904
3911
3912
0x201
1
80 (seconds)
70 (seconds)
0x202
2
100 (seconds)
120 (seconds)

FIG. 40

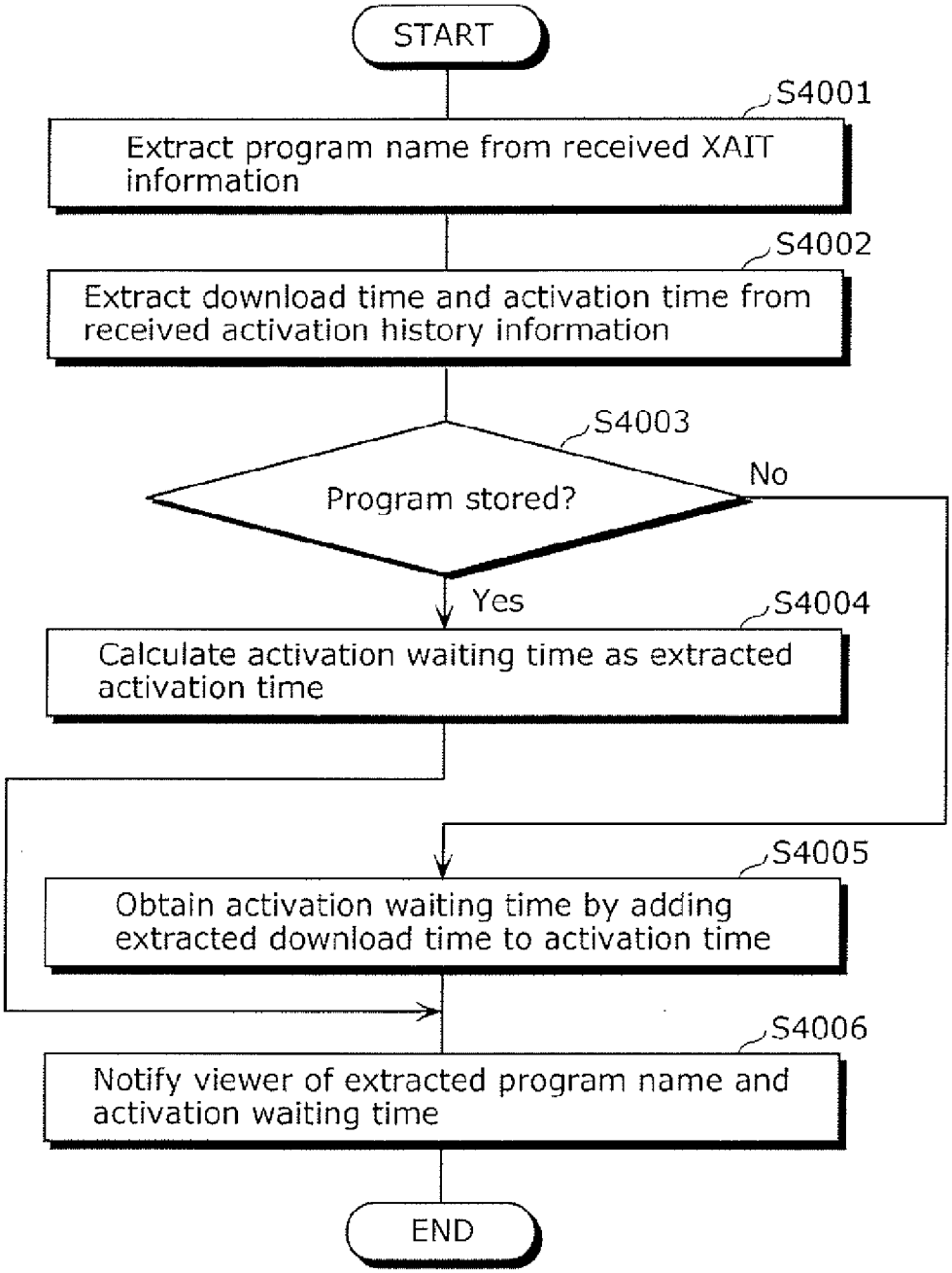

START
S4001
Extract program name from received XAIT information
S4002
Extract download time and activation time from received activation history information
S4003
Program stored?
No
Yes
S4004
Calculate activation waiting time as extracted activation time
S4005
Obtain activation waiting time by adding extracted download time to activation time
S4006
Notify viewer of extracted program name and activation waiting time
END

FIG. 41

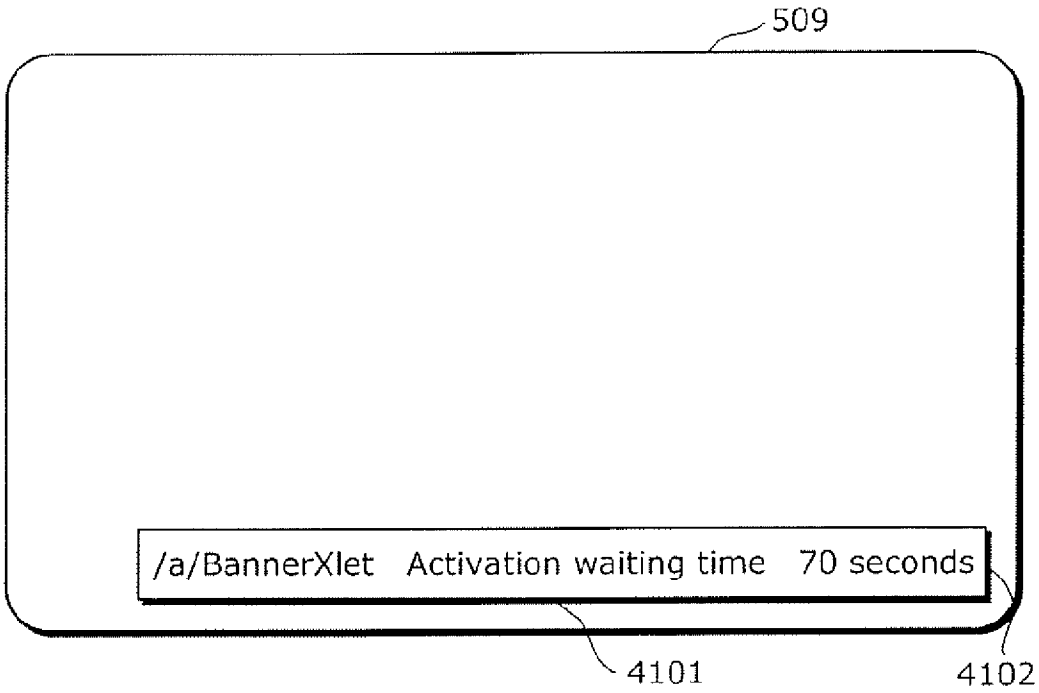

509
/a/BannerXlet Activation waiting time 70 seconds
4101
4102

FIG. 42

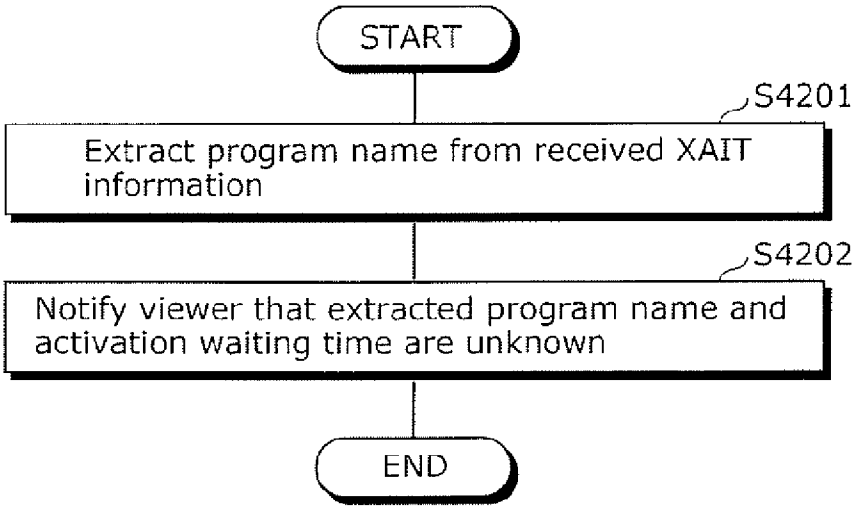

START
S4201
Extract program name from received XAIT information
S4202
Notify viewer that extracted program name and activation waiting time are unknown
END

FIG. 43

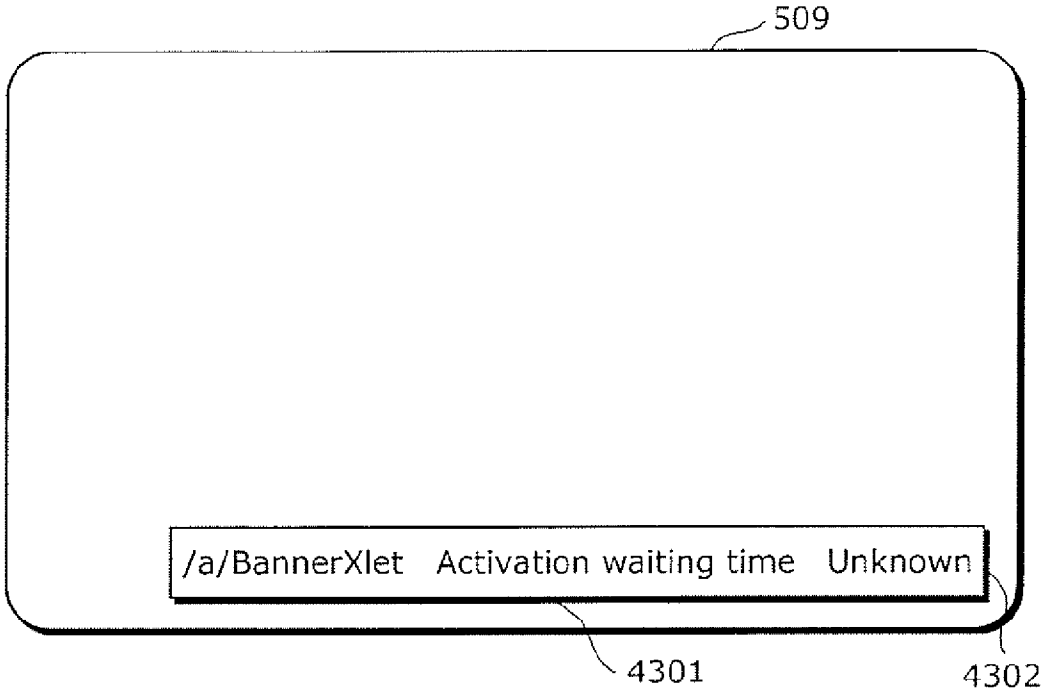

509
/a/BannerXlet Activation waiting time Unknown
4301
4302

FIG. 44

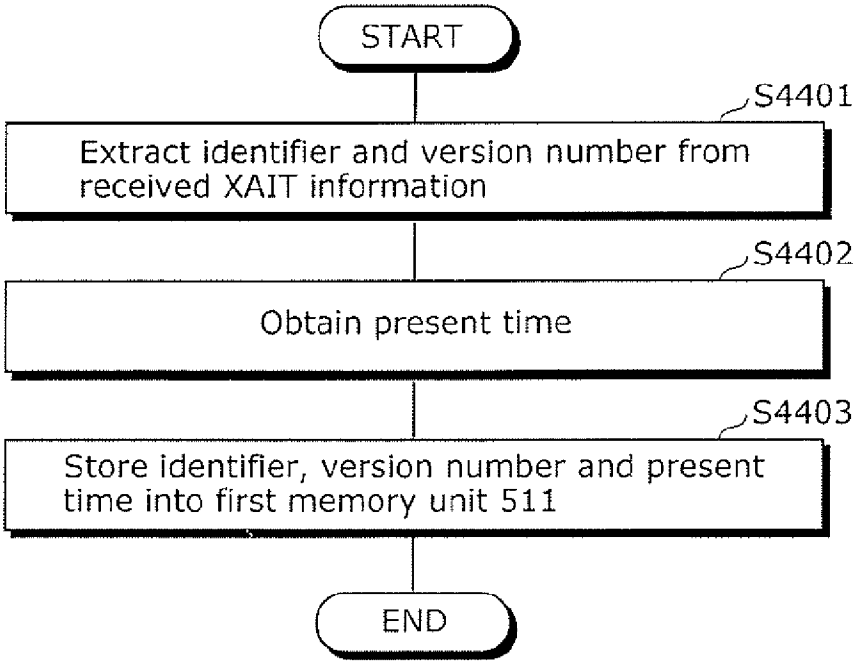

START
S4401
Extract identifier and version number from received XAIT information
S4402
Obtain present time
S4403
Store identifier, version number and present time into first memory unit 511
END

FIG. 45

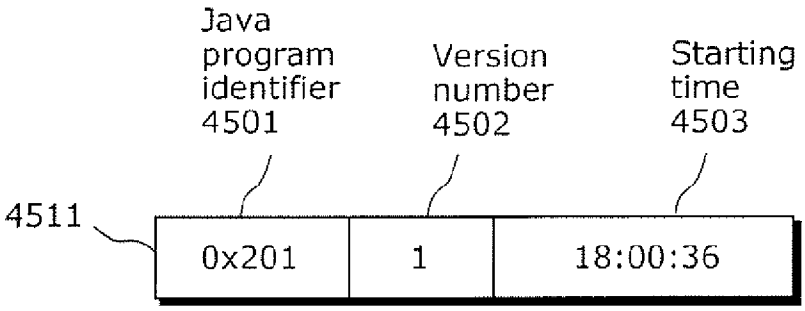

Java program identifier 4501
Version number 4502
Starting time 4503
4511
0x201
1
18:00:36

FIG. 46

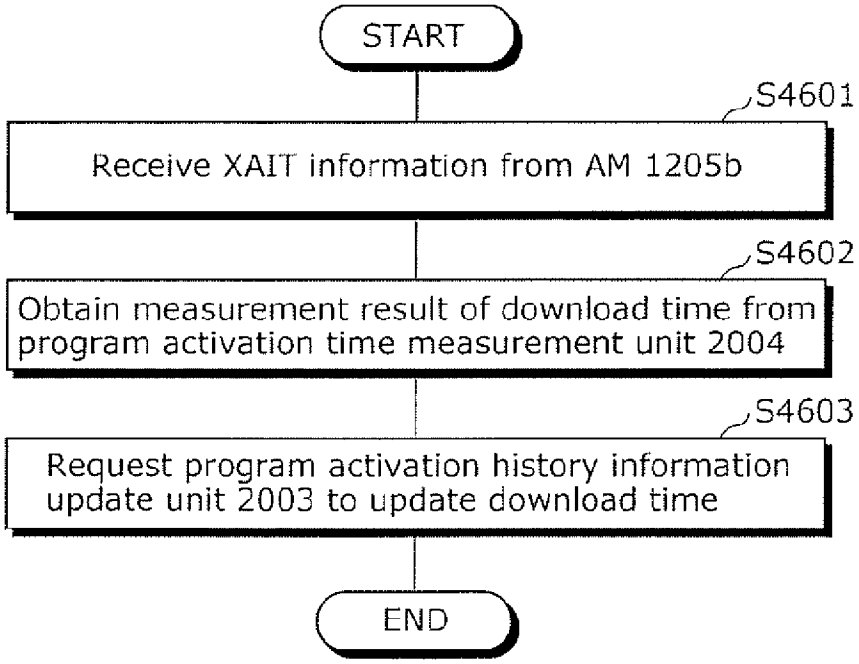

START
S4601
Receive XAIT information from AM 1205b
S4602
Obtain measurement result of download time from program activation time measurement unit 2004
S4603
Request program activation history information update unit 2003 to update download time
END

FIG. 47

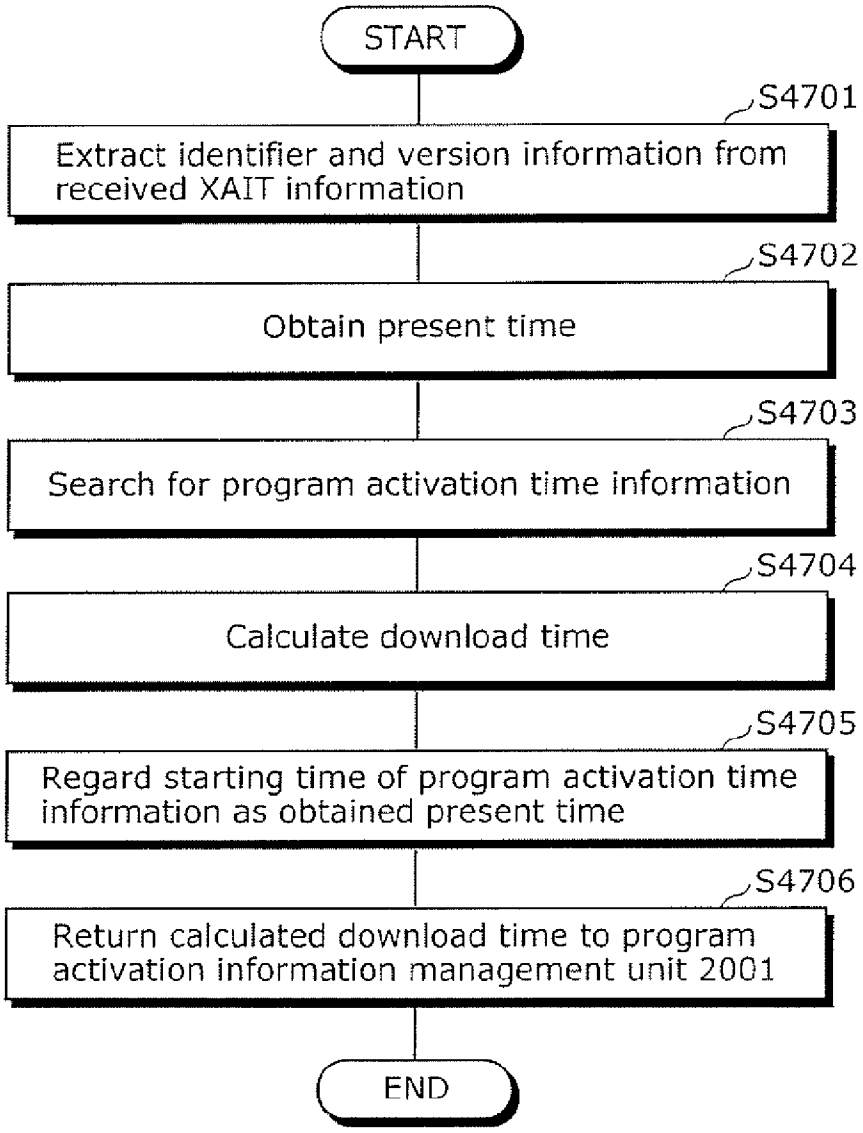

START
S4701
Extract identifier and version information from received XAIT information
S4702
Obtain present time
S4703
Search for program activation time information
S4704
Calculate download time
S4705
Regard starting time of program activation time information as obtained present time
S4706
Return calculated download time to program activation information management unit 2001
END

FIG. 48

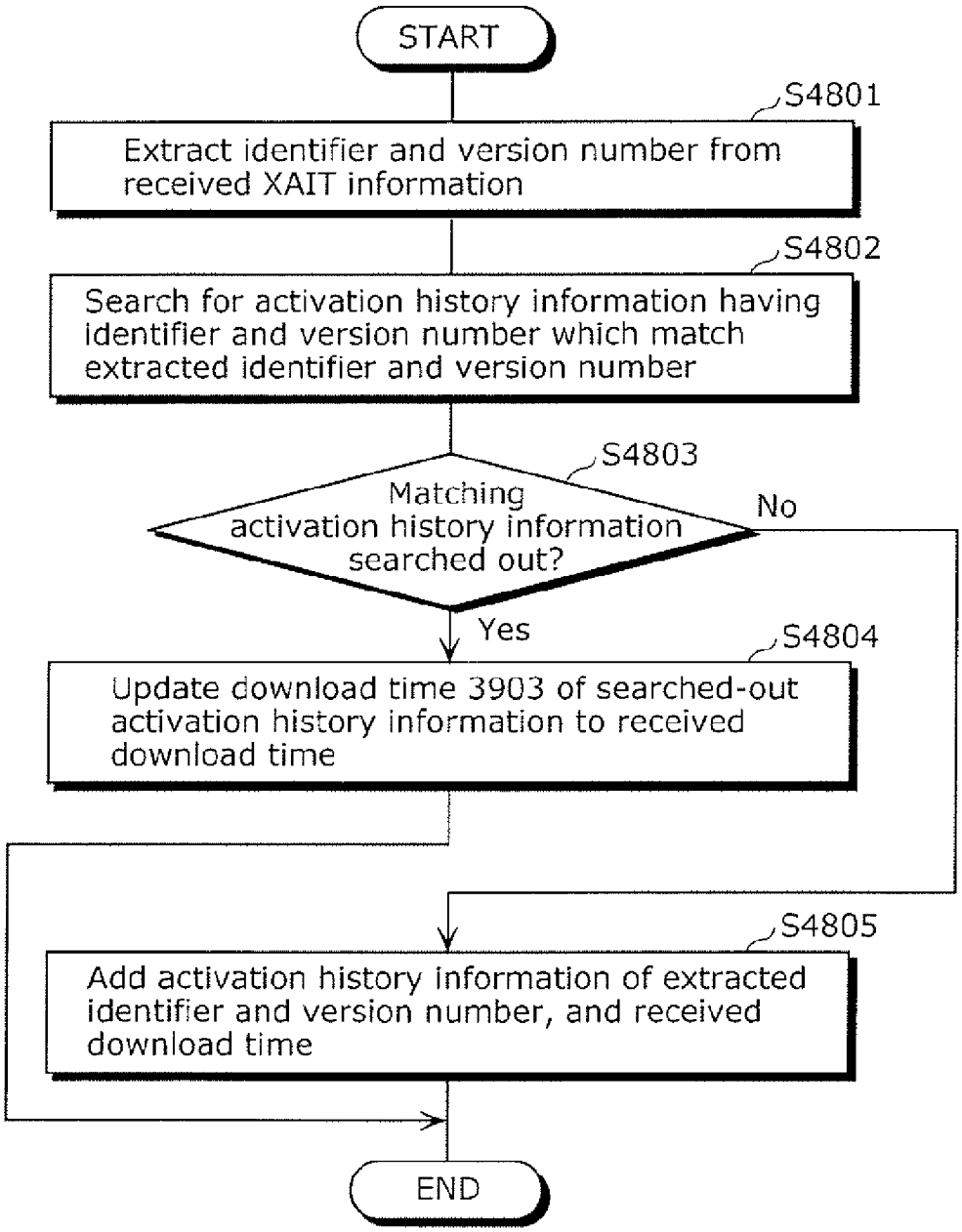

START
S4801
Extract identifier and version number from received XAIT information
S4802
Search for activation history information having identifier and version number which match extracted identifier and version number
S4803
Matching activation history information searched out?
No
Yes
S4804
Update download time 3903 of searched-out activation history information to received download time
S4805
Add activation history information of extracted identifier and version number, and received download time
END

FIG. 49

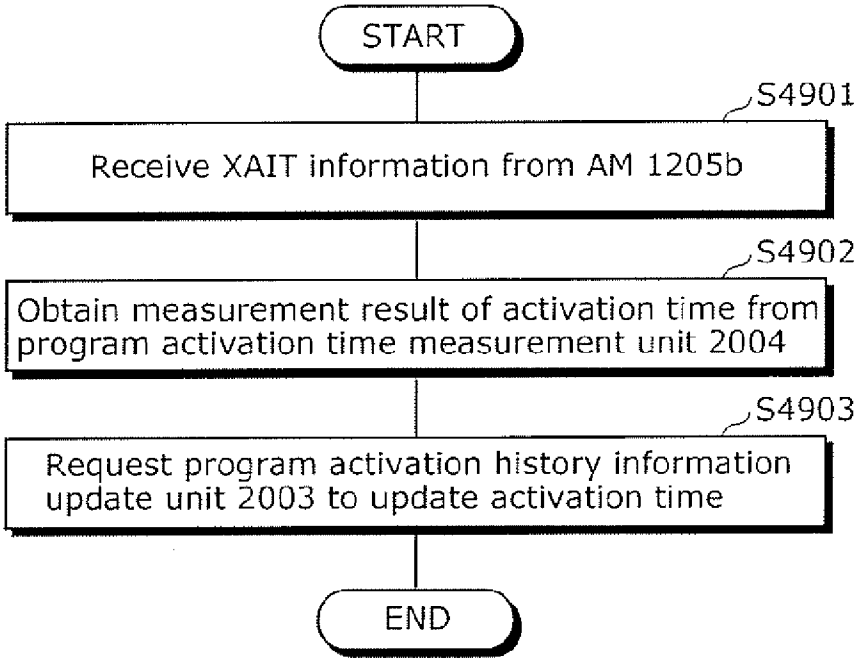

START
S4901
Receive XAIT information from AM 1205b
S4902
Obtain measurement result of activation time from program activation time measurement unit 2004
S4903
Request program activation history information update unit 2003 to update activation time
END

FIG. 50

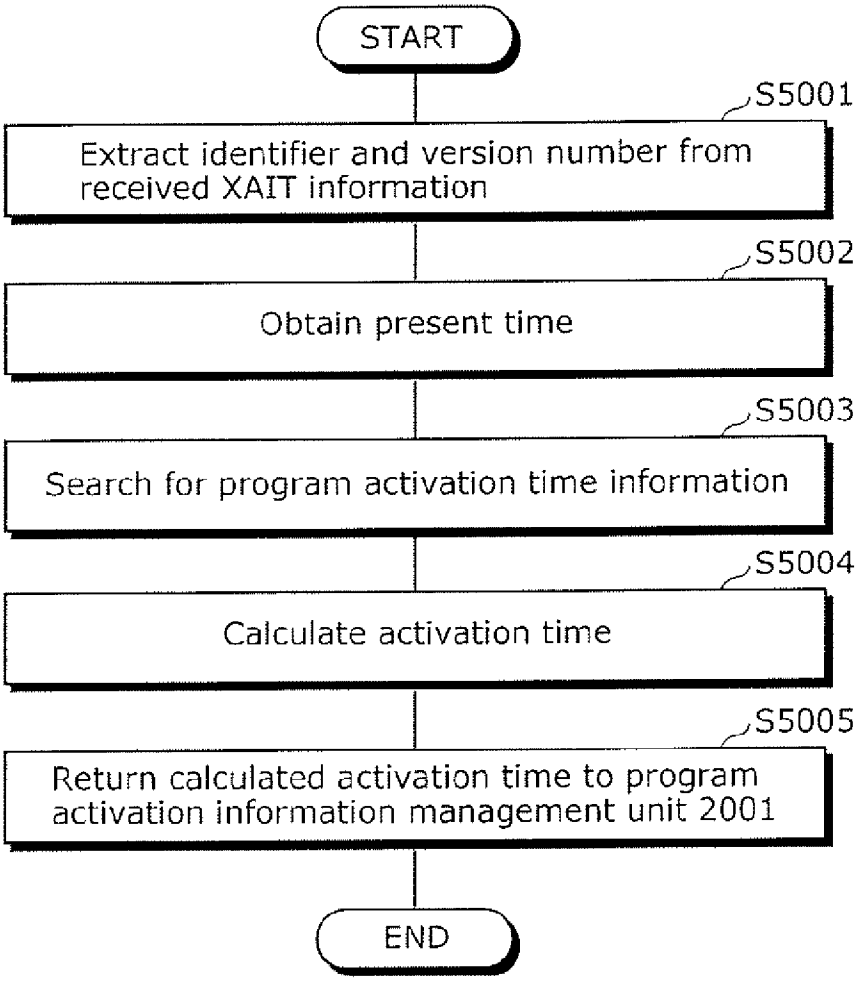

START
S5001
Extract identifier and version number from received XAIT information
S5002
Obtain present time
S5003
Search for program activation time information
S5004
Calculate activation time
S5005
Return calculated activation time to program activation information management unit 2001
END

FIG. 51

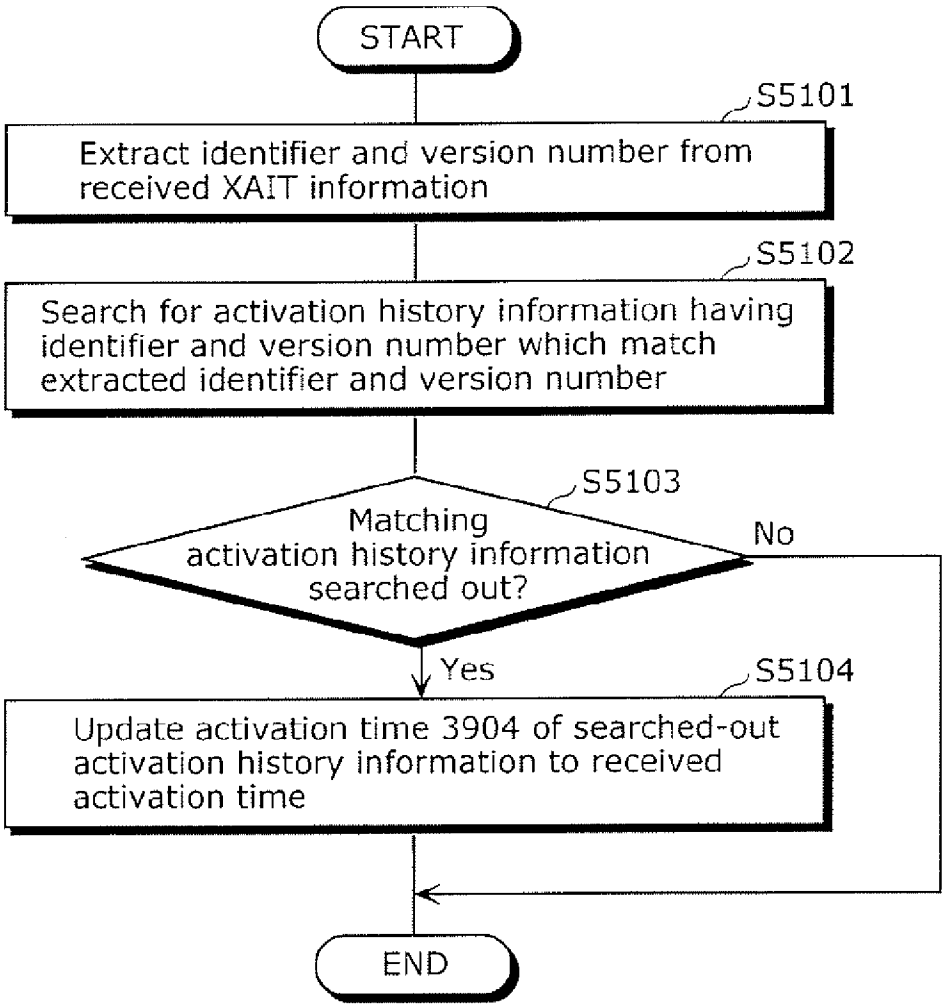

START
S5101
Extract identifier and version number from received XAIT information
S5102
Search for activation history information having identifier and version number which match extracted identifier and version number
S5103
Matching activation history information searched out?
No
Yes
S5104
Update activation time 3904 of searched-out activation history information to received activation time
END

FIG. 52

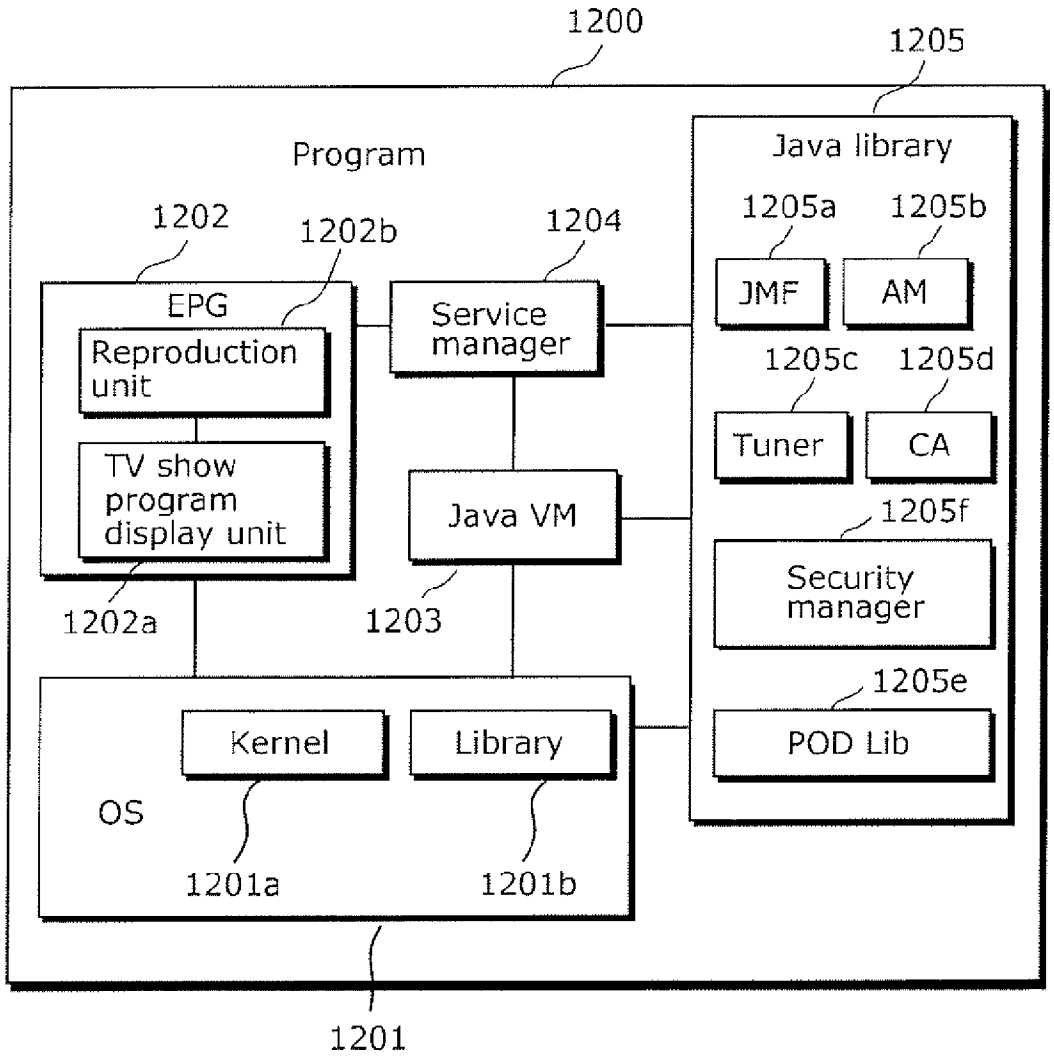

1200
1205
Program
Java library
1202
1202b
1204
1205a
1205b
EPG
Service manager
JMF
AM
Reproduction unit
1205c
1205d
Tuner
CA
TV show program display unit
Java VM
1205f
Security manager
1202a
1203
1205e
Kernel
Library
POD Lib
OS
1201a
1201b
1201

FIG. 53A

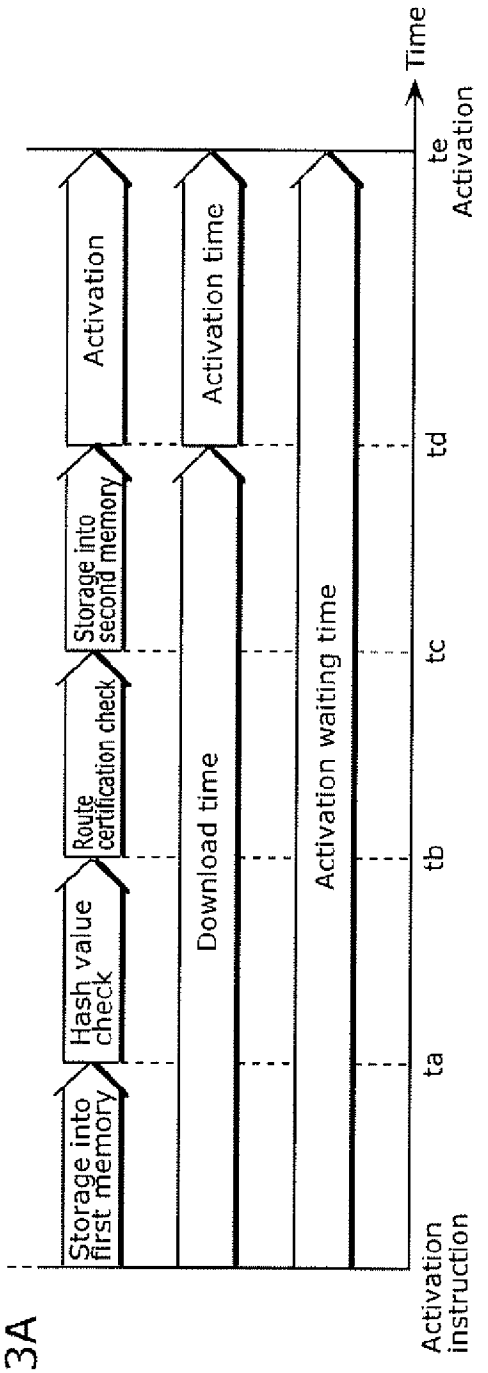


FIG. 53B

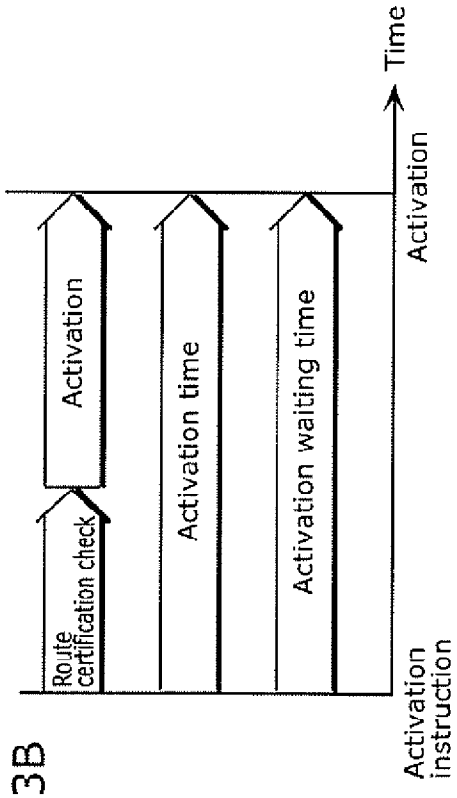


FIG. 54

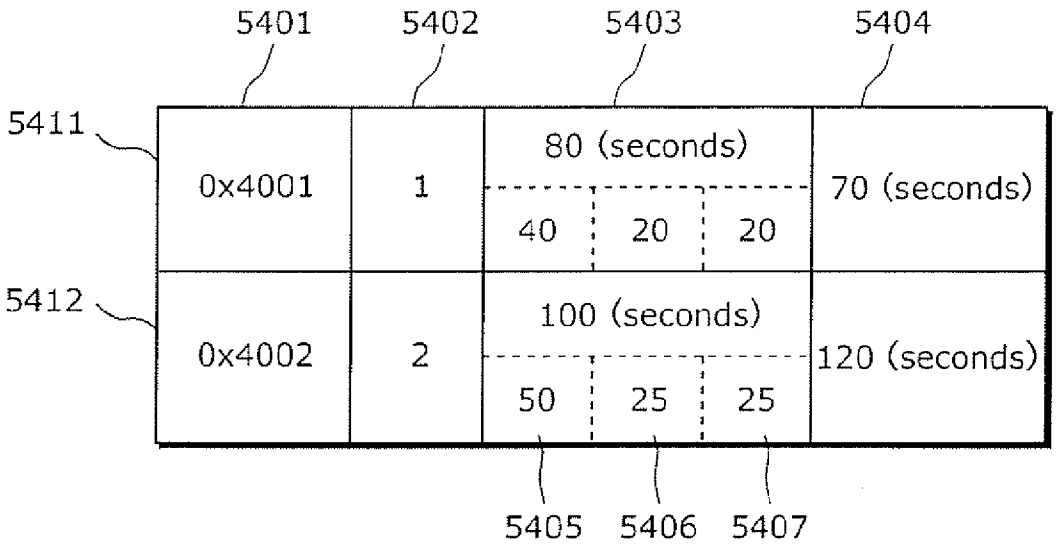

5401
5402
5403
5404
5411
0x4001
1
80 (seconds)
40
20
20
70 (seconds)
5412
0x4002
2
100 (seconds)
50
25
25
120 (seconds)
5405
5406
5407

FIG. 55

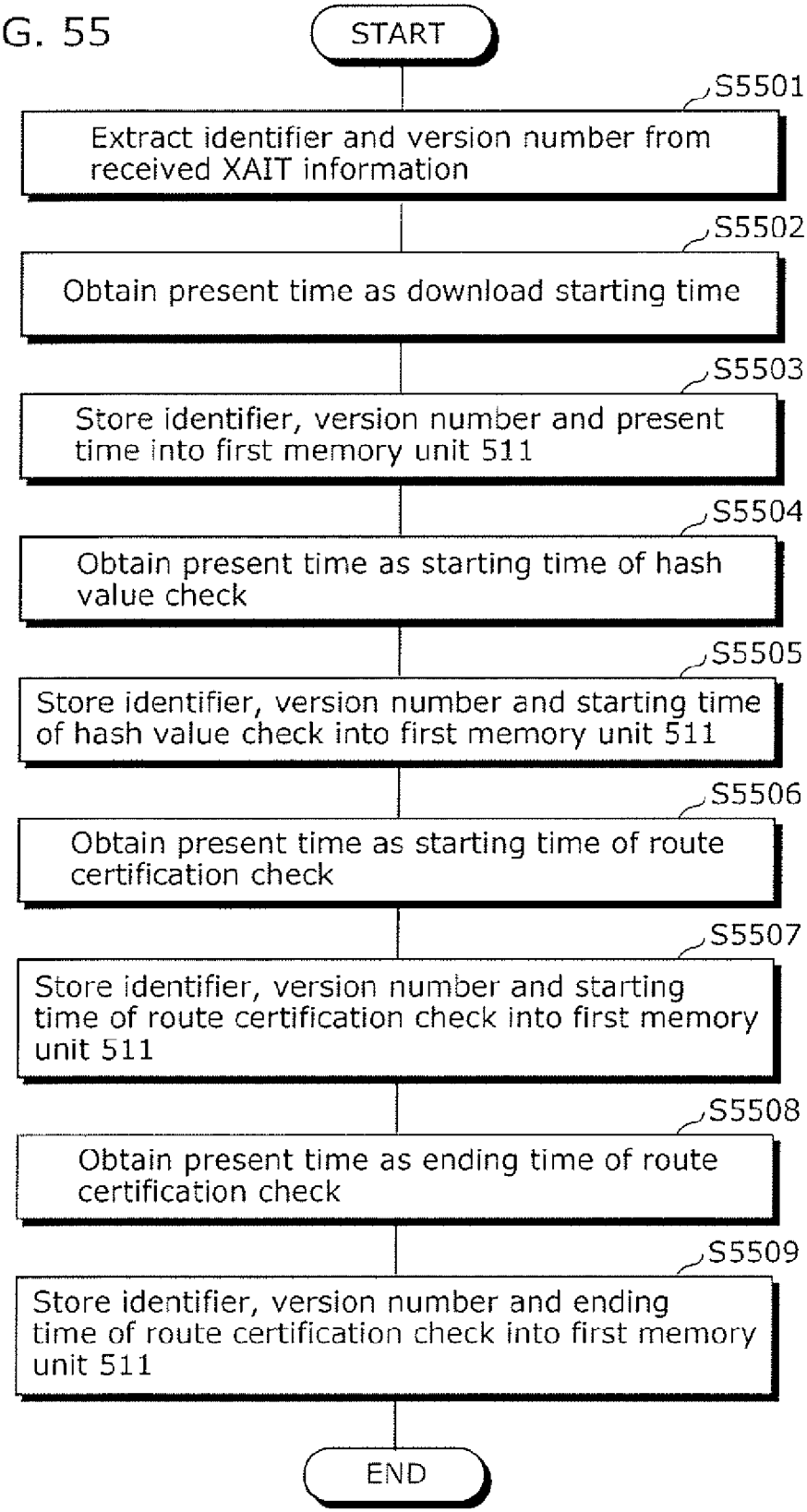

START
S5501
Extract identifier and version number from received XAIT information
S5502
Obtain present time as download starting time
S5503
Store identifier, version number and present time into first memory unit 511
S5504
Obtain present time as starting time of hash value check
S5505
Store identifier, version number and starting time of hash value check into first memory unit 511
S5506
Obtain present time as starting time of route certification check
S5507
Store identifier, version number and starting time of route certification check into first memory unit 511
S5508
Obtain present time as ending time of route certification check
S5509
Store identifier, version number and ending time of route certification check into first memory unit 511
END

FIG. 56A

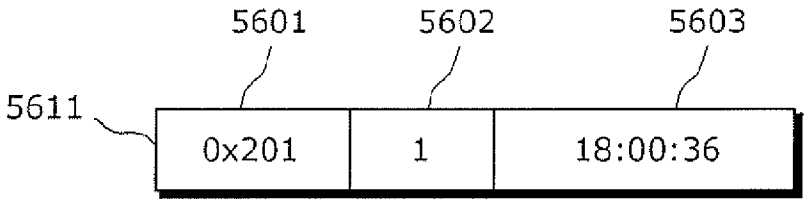


FIG. 56B

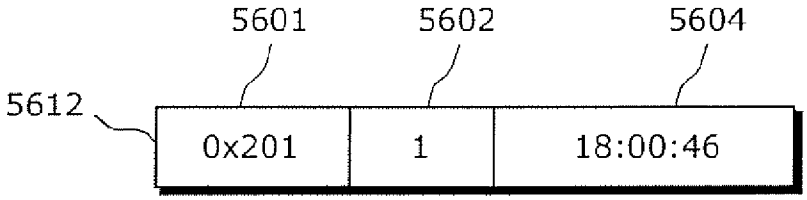


FIG. 56C

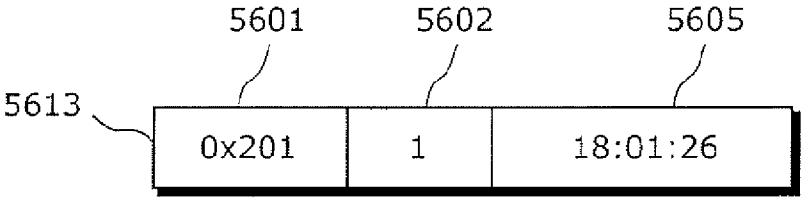


FIG. 56D

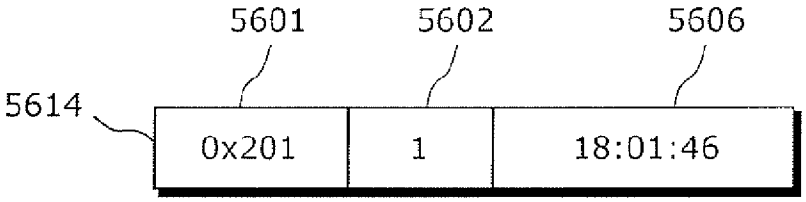
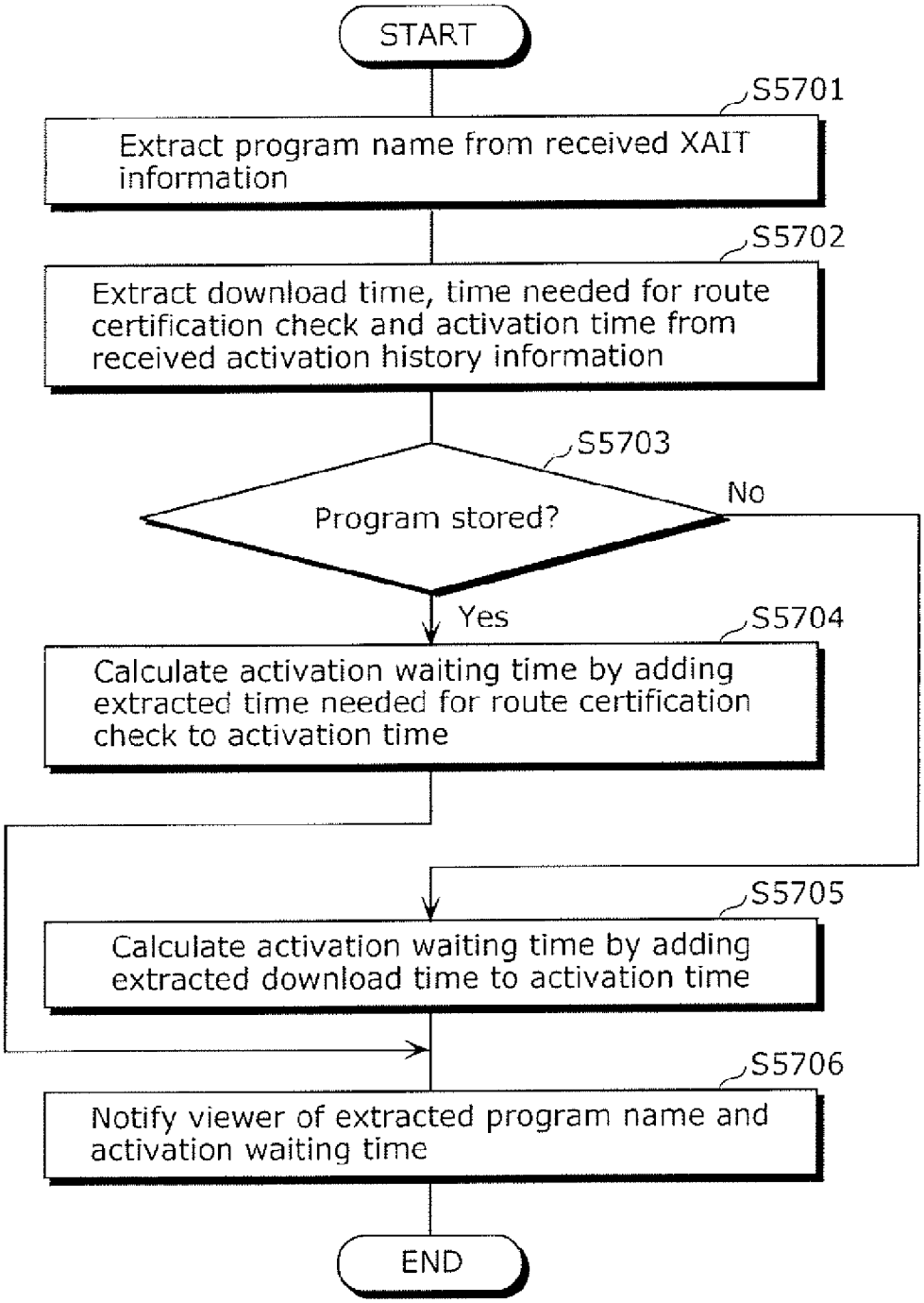


FIG. 57


START
S5701
Extract program name from received XAIT information
S5702
Extract download time, time needed for route certification check and activation time from received activation history information
S5703
Program stored?
No
Yes
S5704
Calculate activation waiting time by adding extracted time needed for route certification check to activation time
S5705
Calculate activation waiting time by adding extracted download time to activation time
S5706
Notify viewer of extracted program name and activation waiting time
END